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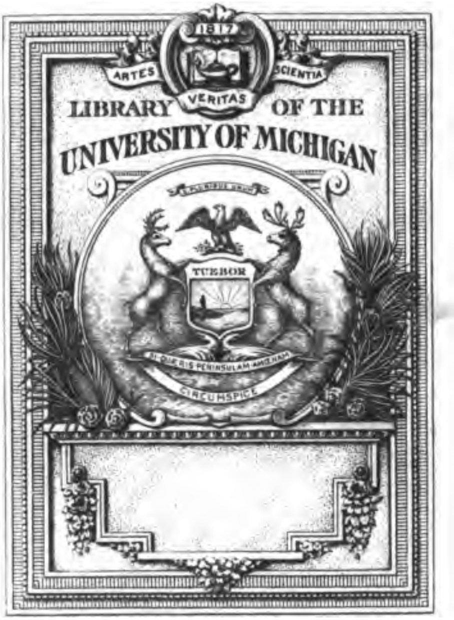

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AN AMERICAN
GEOLOGICAL RAILWAY GUIDE,

GIVING THE

GEOLOGICAL FORMATION AT EVERY RAILWAY STATION,

AND ITS ALTITUDE ABOVE MEAN TIDE-WATER,

WITH

NOTES ON INTERESTING PLACES ON THE ROUTES,

AND

A DESCRIPTION OF EACH OF THE FORMATIONS,

BY

JAMES MACFARLANE, PH. D.,

AUTHOR OF "THE COAL-REGIONS OF AMERICA," AND ONE OF THE COMMISSIONERS OF
THE SECOND GEOLOGICAL SURVEY OF PENNSYLVANIA,

WITH THE CO-OPERATION OF THE STATE GEOLOGISTS, AND OTHER SCIENTIFIC GENTLEMEN.

SECOND EDITION, REVISED AND ENLARGED.

NEW YORK:
D. APPLETON AND COMPANY,
1, 3, AND 5 BOND STREET.
1885.

JAMES MACFARLANE,
257 WASHINGTON ST.
BUFFALO, - - N.Y.

THE first edition of this book was published six years ago. In this second edition the whole work will be revised and very much enlarged, with the aid of many new contributors, and the altitudes of all railway-stations inserted, so far as they can be procured.

These advanced sheets are now issued to assure my numerous correspondents that the work is going on, and will be published as soon as the unavoidable delays in collecting the materials and in the somewhat tedious printing work will permit.

JAMES MACFARLANE,
TOWANDA, PA.

June 1, 1885.

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The Dominion of Canada.[1]

By GEORGE M. DAWSON, D. S., F. G. S.,
Assistant Director of the Geological and Natural History Survey of Canada.

GF
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1855

I. Maritime Provinces.

New Brunswick, Nova Scotia, and Prince Edward Island.

II. Quebec and Ontario.

III. Manitoba and North-West Territory.

IV. British Columbia.

V. Steamboat Routes.

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[1] The Dominion of Canada is, as a matter of convenience in this work, divided into four parts, and rom a geological point of view such division is largely borne out by structural facts.

I. The Maritime Provinces includes Nova Scotia, New Brunswick, and Prince Edward Island.

II. Ontario and Quebec includes the provinces of the same names.

III. Manitoba and so much of the Northwest Territory as is traversed by railway-lines forms the ird division.

IV. British Columbia, together with the eastern slopes of the Rocky Mountains (politically a part f the Northwest Territory) constitutes the fourth.

For each of these great divisions a separate table of formations is given.

For the purpose of enabling the traveler to provide himself with further information on geological oints, the following notes on publications are attached :—Dominion of Canada generally : "Sketch f the Physical Geography and Geology of the Dominion of Canada," with map ; Geological Survey, 84. For economic minerals see also "Descriptive Catalogue of Exhibits at Philadelphia, 1876," nd "Catalogue des Minereaux Roches, etc.," at the Exposition at Paris, 1878, by Dr. B. J. Harring-m. Both published by the Geological Survey.

The "List of Publications of the Geological and Natural History Survey, 1884," enumerates all the ficial reports and maps to date.

I. MARITIME PROVINCES.—"Reports of Progress." Geological Survey. The whole of Cape Bre-n Island, part of the mainland of Nova Scotia, and nearly the whole of New Brunswick have been eologically mapped on contiguous sheets of uniform scale. Maritime Provinces generally : "Aca-ian Geology." Sir W. Dawson. (With supplement and map.) 1878.

The greater part of the really productive coal measures are included in the Province of Nova cotia, the great spread of Carboniferous rocks in New Brunswick having so far been found to con-in but thin, and, generally, scarcely workable, coal-seams. The deposits of the glacial period are ften well shown in railway-cuttings, and extensive tracts are completely covered with these. The oulder-clay is the most persistent and universal. Peaty deposits underlying the boulder-clay have een observed locally ; overlying the boulder-clay are stratified clays, sands, and gravels, and kames re frequent, particularly in New Brunswick. The stratified clays hold marine fossils in the vicinity f the coast of the southern and northern parts of New Brunswick.

The island of Cape Breton affords good coal, and a number of collieries are in operation. As it is ot yet traversed by railway, it does not receive notice in the body of this work, but few places of qual area are of greater interest from a geological or picturesque point of view.

II. ONTARIO AND QUEBEC.—"Geology of Canada." Sir W. Logan. 1863. This work summar-es the main features to date, and is accompanied by an atlas of maps, sections, etc. Sir W. Logan's rge map (25 miles to 1 inch, published 1866) includes, besides Ontario and Quebec, the Maritime rovinces and adjacent portions of the United States, and is much more detailed, for the region cov-red by it, than the map accompanying the sketch of 1884.

From 1863 reports in different portions of the provinces in annual "Reports of Progress." See lso "Esquisse Géologique du Canada," etc. 1867.

III. MANITOBA AND NORTHWEST TERRITORY.—In addition to the sketch of 1884, see reports and aps in annual "Reports of Progress" of Geological Survey, "Report on Geology and Resources of th Parallel," by Dr. G. M. Dawson.

Much information in the possession of the Geological Survey, but yet unpublished, is incorporated the notes on these portions of the Dominion.

IV. BRITISH COLUMBIA.—In addition to the sketch of 1884, see annual "Reports of Progress," 71, to date. A considerable portion of the province is covered by preliminary geological maps, on scale of 8 miles to one inch.

The greater part of the facts for the Dominion of Canada are derived from the reports and maps of he Geological Survey. Dr. G. M. Dawson also wishes to acknowledge assistance received from Dr. elwyn, the director of the Survey, and several members of the staff, especially Messrs. R. W. Ells, . Chalmers, and H. Fletcher. The notes on the Intercolonial Railway are chiefly due to Sir W awson, as elsewhere mentioned.

I. Maritime Provinces.

Nova Scotia, New Brunswick, and Prince Edward Island.

List of Geological Formations.

Quaternary.	**20 c. Saxicava Sand.** **20 b. Leda Clay.** **20 a. Boulder Clay or Till.**	
Triassic.	**16. Upper Red Sandstone, and Traps of Bay of Fundy.** **Upper Red Sandstones of P. E. I.**	
Carboniferous.	**14 c. Upper Carb. and Permo-Carb.** **14 b. Middle Carboniferous.** **14 a. Millstone Grit.**	
	13 a. Lower Carb. **Windsor Group.**[29] (Limestone Gypsum, etc.) **Horton Group.**[30] (Lower Coal Measures.)	Bonaventure formation (in N. E. New Brunswick & E. Quebec).
Devonian.	**12. Catskill.** Scaumenac Beds (Baie des Chaleurs). **11. Chemung and Portage.** **10. Hamilton.** St. John Series. (Cordiate Shale. Dadoxylon Sandstones.) **8. Oriskany, Nictau Series.**	Gaspé Sandstones and equivalents on Baie des Chaleurs.

Silurian.	**7. Lower Helderberg.** **5 c. Niagara.** **5 b. Clinton.**	Upper Arisaig Series. New Canaan Series. Lower Arisaig Series.
Sil.-Camb.	**4. Cobequid Series?** **4. Graptolitic Shales of New Brunswick.**	
Cambrian.	**2 c. Upper Cambrian.** **2 b. Middle Cambrian.** **2 a. Lower Cambrian.**	Miré and St. Andrew Series, Cape Breton. Acadian Series. Atlantic Coast Series, Nova Scotia.
Huronian.	**1 b. Felsitic, Chloritic, and Epidotic Rocks of St. John, Yarmouth, and Cape Breton, in part.**	
Laurentian.	**1 a. Gneiss, Quartzite and Limestone of St. John and St. Anne's Mountain, Cape Breton.**	

Ms.	Intercolonial Railway, N. S.[2]		Ms.	Intercolonial Railway—*Con.*	
0	Halifax.[3]	2. Lower Cambrian.	90	Wentworth.[8]	5–7. Silurian.
8	Bedford.	"	96	Greenville.	13 a. Lower Carbonif.
13	Windsor Junc.[4]	"	103	Thompson.	"
30	Elmsdale.[5]	Contact 2 Low. Camb. and 13 a. Low. Carb.	109	Oxford.[9]	14 a. Millstone Grit.
39	Shubenacadie.	13 a. Lower Carbonif.	111	River Philip.	"
61	Truro.[6]	16. Triassic.	122	Spring Hill Jn[10]	"
78	Londonderry.[7]	13 a. Lower Carbonif.	126	Athol.	14 c. Upper Carbonif.

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[2] These notes are extracted, with little alteration, from a chapter by Sir W. Dawson, in "Handbook for the Dominion of Canada." Published by Dawson Brothers, Montreal. 1884.

[3] Halifax. Quartzites and slates of the coast series, or gold series, of Nova Scotia, believed to be of Lower Cambrian age. In the vicinity of Halifax and elsewhere it contains auriferous quartz mines. The nearest of these are situated at Montague and Waverly. The auriferous veins often also contain mispickel, and sometimes blend and other minerals. They run generally parallel to the strike of the inclosing rocks. The richly auriferous veins are seldom of great width, and the gold is sometimes disseminated also in the contiguous slate. The age of formation, of some at least, of the veins is subsequent to the Carboniferous, as auriferous conglomerates of Lower Carboniferous age with derived gold occur, and have actually been worked, at Gay's River. At Northwest Arm and other places may be seen granite, which traverses these beds as thick dikes or intrusive masses, and produces contact metamorphism. At Waverly Mine the obscure fossil named *Astropolithon* may be found in the quartzite.

[4] Windsor Junction. Excellent exposures of the fossiliferous Lower Carboniferous limestones, and of the great beds of gypsum characteristic of that formation in Nova Scotia.

[5] Elmsdale. Beyond Gay's River, the railway enters the Carboniferous country, and in some places quarries in the Lower Carboniferous limestone may be seen near the road.

[6] Truro. At and beyond Truro, the railway traverses a portion of the Triassic red sandstones of Cobequid Bay. The sandstones may be seen in the cuttings, and the red color of the soil is characteristic. In approaching the Cobequid Hills, a more broken country, and beds of sandstone and conglomerate indicate the Carboniferous beds, which here reappear from under the red sandstone.

[7] Londonderry. The road here enters a belt of highly-inclined slaty rocks of olive-gray and dark colors, which, at a little distance west of the railway-line, contain large and productive veins of iron-

Ms.	**Intercolonial Railway**—*Con.*	
130	Maccan.[11]	14 b. Middle Carbonif.
138	Amherst, N.B.[12]	14 c. Upper Carbonif.
144	Aulac.	14 c. “ 14 a. Millstone Grit.
147	Sackville.	14 c. Upper Carbonif.
159	Dorchester.[13]	13 a. Lower Carbonif.
167	Memramcook.	“
179	Painsec Junc.[14]	14 a. Millstone Grit.
187	Moncton.[15]	“
195	Berry's Mills.	“
206	Canaan.	“
215	Coal Branch.	“
224	Weldford.	“
238	Kent Junction.	“
244	Rogersville.	“
255	Barnaby River.	“
259	Chatham Junc.	“
265	Newcastle.	“
275	Beaver Brook.	14 a. Millstone Grit.
286	Bartibogue.	“
296	Red Pine.	“
309	Bathurst.[16]	13 a. Lower Carbonif.
321	Petite Roche.[17]	5–7. Silurian.
329	Belledune.	“
338	Jacquet Riv'r.[18]	“ and 13 a. Lower Carboniferous.
347	New Mills.	5–7. Silurian.
353	Charlo.	13 a. Lower Carbonif.
363	Dalhousie Jn.[19]	“
372	Campbellton.	8 – 12. Devonian and Doleritic trap.
385	Metapedia.[20]	5–7. Silurian.
395	Mill Stream, Q.	“
405	Assametquag'n.	“
420	Causapscal.	“
433	Amqui.	“

ore, worked by the Steel Co. of Canada. This vein, or aggregation of veins, is primarily of carbonate of iron and ankerite, with some specular iron, and has been changed in many places to a great depth into limonite, which is the ore principally worked. Beyond this place the slates are seen to be pierced by great intrusive masses of red syenite and by dikes of diorite and diabase.

8. Wentworth. The rocks mentioned above are here overlain by dark-colored shaly beds, holding fossils of the age of the Clinton or older part of the Upper Silurian. The gray slates holding the iron-ore are obviously of greater age, but how much greater is uncertain. For reasons stated in "Acadian Geology," they are regarded by Sir W. Dawson as Lower Silurian. Crossing the Cobequid Hills, conglomerates are seen belonging to the southern edge of the Cumberland coal-field, on which the road now enters.

9. Oxford. Contact of Lower Carboniferous and millstone grit.

10. Springhill. Brines from Carboniferous, utilized on small scale in manufacture of salt, 2½ miles from Springhill mines. A branch road leads to the mines of the same name, the most important coal-mines on this railway. Seven coal-seams, varying in thickness from two feet to thirteen feet six inches, are known in this district. The "black seam," eleven feet thick, is that which has been most extensively worked. The mines supply the coal used on the railway.

11. Maccan. Conveyance may be taken from here to the South Joggins, on the shore of Chegnecto Bay, twelve miles distant. The section of the Carboniferous rocks on this part of the coast is one of the most instructive in existence, and has been rendered classic by the writings of Sir W. E. Logan, Sir C. Lyell, and Sir W. Dawson. The section displays over 14,000 feet in vertical thickness of strata, extending from the marine limestones of the Lower Carboniferous to the top of the coal-measures, and includes seventy coal-seams, of which, however, only two are of workable thickness. Besides numerous fossil plants (including erect sigillaria), the beds here yield reptilian remains and land-shells.

12. Amherst. Near here fine examples of the alluvial deposits of the Bay of Fundy; more especially the great marshes of Amherst and Sackville.

13. Dorchester. Good sections of millstone grit formation. The contact between this formation and the Lower Carboniferous here. Copper-mine. Between Dorchester and Memramkook, salt-marsh.

14. Painsec Junction. On Shediac Branch, Carboniferous, chiefly or entirely millstone grit.

15. Moncton. From this point to near Bathurst the railway passes over the low Carboniferous plain of Northern New Brunswick, showing scarcely anything of the underlying rocks.

16. Bathurst. Beyond this point is the varied and interesting country of the Baie des Chaleurs, and the Restigouche and Metapedia Rivers, of which it is possible only to note some of the more striking features. Three miles beyond Bathurst, line crosses dolerite intrusion 1 mile. A short distance north of station good sections of leda clay and saxicava sand, with fossils.

17. Petite Roche. From this station to Charlo, numerous massive intrusive bodies of dolerite cutting through the Silurian rocks.

18. Jacquet River. The Lower Carboniferous here forms a narrow fringe along the shore From this station to Dalhousie, many good sections of leda clay and saxicava sand, with fossils.

19. Dalhousie. From Dalhousie the following localities may be visited: At Cape Bon Ami, near Dalhousie, a fine section of Upper Silurian shale and limestone, abounding in fossils, and alternating with very thick beds of dark-colored dolerite. Apparently resting on these are beds of red porphyry and breccia, forming the base of the Devonian. On these, a little west of Campbellton, rest agglomerate and shale, rich in remains of fishes (*Cephalaspis*, *Coccosteus*, etc.), and traversed by dikes of trap. Immediately above these, conglomerates and hard shales, the latter full of remains of *Psylophyton* and *Arthrostigma*, and at a sandstone-quarry at the opposite side of the Restigouche, are similar plants, with great silicified trunks of *Protolaxites*. All these beds are Lower Erian or Devonian. At Scaumenac Bay, opposite Dalhousie, are magnificent cliffs of red conglomerate of the Lower Carboniferous, and appearing from under these are gray sandstones and shales of Upper Erian age. These contain many fossil fishes, especially of the genus *Pterichthys*, also fossil ferns.

20. Metapedia. The rocks exposed about here are principally slates and shales with marked slaty structure, of Upper Silurian age. Fine exposures in cuttings. Fossils occur in calcareous bands. Passing Lake Metapedia, at the head of the river, the railway cuts through some limestone, probably of Hudson River age, and then passes into Lower Silurian, and probably, in part, Cambrian, shales, sandstones, and conglomerates, of which the greater part are referred to the Quebec group. At the mouth of Metapedia River leda clay and saxicava sand, with fossils.

Intercolonial Railway—*Con.*

Ms.		
441	Cedar Hall.	5–7. Silurian.
448	Sayabec.	“
458	Tartague.	2. Cambrian, and 4. Camb. Silurian.
469	Little Metis.[21]	“
477	St. Flavie.	“
485	St. Luce.	“
495	Rimouski.	“
506	Bic.[22]	“
515	St. Fabien.	“
525	St. Simon.	“
534	Trois Pistoles.	“
544	Isle Verte.	“
555	Cacouna.	“
561	Rivière du Loup	“
567	Notre Dame.	“
573	St. Alexandre.	“
578	St. Andre.	“
581	St. Helene.	“
587	St. Pascal.	“
591	St. P. de Ner.	“
596	Rivière Ouelle.	“
602	St. Anne.	“
610	St. Roche.	“
613	Elgin Road.	“
617	St.JeanPort Joli	“
622	Trois Saumons.	“
625	L'Islet.	“
629	L'Anse à Gile.	“
632	Cap St. Ignace.	“
639	St. Thomas.	“
646	St. Pierre.	“
649	St. François.	“
653	St. Valier.	“
657	St. Michel.	“
663	St. Charles Jn.	“
672	Harlaka.	“
677	Levis.	“
678	Point Levis[23] (op. Quebec).[24]	“

Intercolonial Railway—*Con.*

St. John to Moncton.

Ms.		
0	St. John, N.B.[55]	2. Lower Cambrian.
3	Coldbrook.	“
9	Rothsay.	1 a. Laurentian.
17	Nauwigewauk.	13 a. Lower Carbonif.
22	Hampton.	“
26	Passekeag.	“
27	Bloomfield.	“
33	Norton.	“
39	Apohaqui.	“
44	Sussex.[25]	“
51	Penobsquis.	“
60	Anagance.	14 a. Millstone Grit.
66	Petitcodiac.	“
76	Salisbury.	Contact 14 a. Millstone Grit and 13 a. L. Carb.
89	Moncton.[26]	14 a. Millstone Grit.

Pictou Branch.

61	Truro, N. S.	16. Triassic.
70	Union.	13 a. Lower Carbonif.
74	Riverdale.[27]	14 a. Millstone Grit.
80	West River.	5–7. Silurian.
89	Glengarry.	13 a. Lower Carb., *etc.*
96	Hopewell.	“
104	N. Glasgow.[28]	14 b. and c. Coal Meas.
112	Pictou Land'g.	14 c. Up. Coal Format'n.
113	Pictou.	“

Shediac Branch.

179	Painsec Jn.NB.[14]	14. Carboniferous.
184	Dorchester Rd.	“
188	Shediac.	“
190	Pt. du Chêne.	“

Windsor and Annapolis Railway, N. S.

0	Halifax.[3]	2. Lower Cambrian.
13	Windsor Junc.[4]	“
30		Intrusive Granite & 2 Lower Cambrian.

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21. Little Metis. Cuttings in slates of the Quebec group. The River St. Lawrence, here thirty miles wide, suddenly breaks upon the view after passing Metis station. Beyond this point the line follows the strike of the Quebec group all the way to Point Levis, opposite Quebec.

22. Bic. Conglomerates here specially worthy of notice and well shown in cuttings.

23. Point Levis. In cuttings on a new connecting railway, about a mile from the station, beds holding *Graptolites.*

24. The rocks on which the city of Quebec stands are believed to be of Hudson River and Utica age, and fossils (*Graptolites*) lately obtained there confirm this view. The great Champlain and St. Lawrence fault cuts the north shore of the river west of Cape Rouge, and bending round, again cuts the shore immediately south of the city, and thence follows the channel of the river between Quebec and Point Levis. The falls of Montmorenci, near Quebec, are of great beauty, and show in the gorges Utica shale resting on Laurentian gneiss, which at the "natural steps" above the falls is overlain by Trenton limestone. Half way between the city and the falls, at a mill in the village of Beauport, is a bank of boulder-clay overlain by fossiliferous sand and gravel (saxicava sand), rich in *Saxicava rugosa* and other shells. Clays with a somewhat richer fauna (upper leda clay) occur in the bank of a brook a little farther from the road to the north.

25. Sussex. Brines from the Lower Carboniferous, employed to a small extent for salt-manufacture.

26. Moncton. Between this station and Salisbury, in cuttings and gravel-pits, leda clays and saxicava sands.

27. Riverdale. The millstone grit series consists of sandstones and shales, often red, and conglomerate, associated with dark-colored beds holding fossil plants and *Naiadites*, with a few underclays and thin seams of coal ("Acadian Geology").

28. New Glasgow. In this vicinity several important coal-mines. The productive coal area, so far as yet proved, is about nine miles long by three and a half wide, with an area of twenty-two square miles. Though thus limited in extent, the seams are extremely thick. The most important of these are

Windsor and Annapolis Railway— *Continued.*

Ms.		
39	Newport.	13 a. Lower Carbonif.
45	Windsor.[29]	" (Windsor ser.)
47	Falmouth.[30]	" "
52	Hantsport.	" (Horton ser)
63	Wolfville.[31]	13 a. Lower Carb. and 5–7. Silurian.
65	Port William.	16. Triassic.
70	Kentville.[32]	16. Triassic & 14. Carb.
82	Berwick.	"
87	Aylesford.	"
98	Wilmot.	"
101	Middleton.	"
107	Lawrenceton.	"
115	Bridgetown.[33]	"
121	Round Hill.	"
129	Annapolis.	"

New Brunswick Railway.

(Formerly European and North American.)

St. John to Vanceboro.

0	St. John.[55]	2. L. Camb. (Acadian.)
–	Carleton.[34]	"
4	Fairville.	1 a. Laurentian.
6	South Bay.	1 a. Lauren. limestones.
8	Sutton.	1 a. Laurentian.
11	Grand Bay.	13 a. L. Carbonif. & Pre-Cambrian.
15	Westfield.[35]	1. Pre-Cambrian.
20	Nerepis.[36]	1. Pre-Cambrian and 13 a. L. Carbonif.
22	Eagle Rock.	Granite.
25	Wellsford.	"

New Brunswick Railway—*Con.*

St. John to Vanceboro.

Ms.		
30	Clarendon.	Granite.
33	Gaspereaux.	4. Cambro-Silurian.
36	Enniskillen.	8–12. Devonian.
38	Hoyt.[37]	8–12. Devonian and 13 a. Low. Carbonif.
42	South Branch.	14 a. Millstone Grit.
46	Fredericton Jn.	"
49	Tracy.	"
61	Cork.	"
66	Harvey.	13 a. Lower Carbonif.
72	Prince William.	4. Cambro-Silurian.
76	Magaguadavic.	"
85	McAdam.	"
91	St. Croix.	"
92	Vanceboro, Me.	"
118	Danforth, "	1 b. Huronian,
160	Lincoln, "	"
183	Old Town, "	"
206	Bangor, "	"

0	St. Andrews.	14 b. Middle Carbonif.
5	Chamcook.[49]	"
15	Roix Road.	5–7. Silurian.
17	G. S. R'y Cross.	"
20	Rolling Dam.	4. Cambro-Silurian.
24	Dumbarton.	"
28	Watt Junc.[38]	"

0	St. Stephens.[44]	Granite.
5	Maxwell.	4. Cambro-Silurian.
8	Moore's Mills.	"
15	Meadows.	"
19	Watt Junc.	"

the "main seam," and "deep seam." The first has a thickness of thirty-eight feet six inches, and is capable of yielding at least twenty-four feet of coal of good quality. The "deep seam" (one hundred and sixty feet below) shows seven feet eight inches of good coal with three feet six inches of shaly coal. The coals are bituminous, and yield, as a rule, a good coke. A material known as "stellar coal," which is in reality an earthy bitumen, occurs near Stellartown, but is not at present worked. It is capable of yielding from 50 to 126 gallons per ton of oil, on distillation. The New Glasgow conglomerate seen at the road-bridge and elsewhere is a peculiar deposit locally developed in the Carboniferous, possibly nearly on the horizon of the coals. On the East River, above New Glasgow, important occurrences of iron-ore, limonite, specular iron-ore, and bedded hæmatite. These have not been worked.

29. Windsor. The Windsor series, or Lower Carboniferous limestone and gypsiferous beds, is a marine formation, holding characteristic shells and corals of the Lower Carboniferous period, and containing, in addition to the limestone, thick beds of sandstone, marl, and clay, usually red, and gypsum ("Acadian Geology").

30. Falmouth. The Horton series, or Lower Carboniferous coal measures, underlies the last, and consists of hard sandstones and shales, often calcareous, associated with conglomerate and grit, and in some places with highly-bituminous shales. It holds underclays and thin coaly seams, remains of plants, fishes, and entomostracans, and footprints of batrachians, but no strictly marine remains ("Acadian Geology").

31. Wolfville. From this point to Kentville the alluviums and marshes of the Bay of Fundy shores may be seen to the north.

32. Kentville. Though marked Triassic to Annapolis, the line of the railway runs throughout near the line of junction of this formation with Silurian, Devonian (Oriskany), and intrusive granites, which form the hills to the south. To the northward is visible the continuous ridge of the North Mountain, which intervenes between the Cornwallis and Annapolis Valley and Bay of Fundy shore. This is composed of Triassic traps, which overlie the red sandstones of the same formation. Cape Blomidon (near Wolfville) is the eastern extremity of the North Mountain. In this lofty cliff (four hundred feet) columnar basaltic trap is underlain by amygdaloid, containing numerous zeolitic minerals. The base is formed of red sandstone with gypsum veins. The cliffs bordering the coast from Cape Blomidon westward afford many zeolites in fine crystals.

33. Bridgetown. At Paradise, east of this station, fine crystals of smoky quartz derived from veins in granite.

34. Carleton. This town is, like St. John, on Lower Cambrian rocks, but the railway immediately enters an area of Pre-Cambrian, and turning round northward passes into Laurentian.

35. Westfield. Immediately beyond Westfield an outlyer of Lower Carboniferous one mile wide. Pre-Cambrian rocks then extend to Nerepis, which is on (or near) a very small Lower Carboniferous outlyer.

36. Nerepis. Beyond this station Silurian 1½ mile, followed by granite.

Ms.	**New Brunswick Railway**—*Con.*	
28	Watt Junc.[38]	4. Cambro-Silurian.
29	Lawrence.	4. Cam.-Silurian and 8–12. Devonian.
43	McAdam Jun.[38]	4. Cambro-Silurian.
49	Vanceboro, Me.	4. Cambro-Silurian.
59	Deer Lake.	Granite.
65	Canterbury.	4. Cambro-Silurian.
75	Benton.	Syenite.
83	Debec. Junc.	5–7. Silurian.
94	Woodstock.	4. Cambro-Silurian.
83	Debec Junc.	5–7. Silurian.
86	Greenville.	"
90	Houlton, Me.	"
94	Woodstock.[39]	4. Cambro-Silurian.
96	Up. W'dstock[40]	"
100	Newberg Junc.	5–7. Silurian.
157	Gibson.	14 b. Middle Carbonif.
107	Hartland.	5–7. Silurian.
111	Peel.	"
117	Florenceville.	"
120	Kent.	"
123	Bath.	"
135	Kilborn.	"
143	Perth.	"
143	Andover.	"
149	Aroostook.	"
156	F't Fairfield, Me.	"
163	East Lyndon, "	"
168	Caribou, "	"
183	Presque Isle, "	"
149	Aroostook.	"
167	Grand Falls.	"
181	St. Leonard's.	"
198	Green River.	"
201	St. Basil.	"
207	Edmundston.	"

Ms.	Between Gibson and Woodstock.	
0	Gibson.	14 b. Middle Carbonif.
12	Keswick.	4. Cambro-Silurian & 14 b. Middle Carbonif.
20	Zealand.	4. Cambro-Silurian.
28	Upper Keswick.	Granite.
38	Millville.	4. Cambro-Silurian.
47	County Line.	"
52	Woodstock Jn.	"
57	Newberg Junc.	5–7. Silurian.
61	Up. Woodstock.	4. Cambro-Silurian.
63	Woodstock.[39]	"

Cumberland Railway.

0	Springhill Jn.[10]	14 a. Millstone Grit.
—	" Mines.	14 b. Middle Carbonif.
—	Southampton.	14 a. Millstone Grit.
—	Half-way Lake.	13 a. Lower Carbonif.
32	Parsboro.	"

Waterloo and Magog Railway.

Province of Quebec.

0	Magog.[41]	5–7. Silurian.
3	Castle Brook.	"
5	Oxford L.	"
7	Amber Brook.	1. Pre-Cambrian.
9	Eastman.	"
11	Dillonton.	"
17	S. Stukely.[42]	"
23	Waterloo.	"

Prince Edward Island Railway.[43]

(198 miles in operation.)

Province—Prince Edward Island.

43 The whole of this island consists of Permo-Carboniferous and Triassic rocks, with general red color, which has also been communicated to the overlying drift and soil. The surface is rolling and generally drift-covered, so that it has so far been found impossible to separate the two formations above mentioned except quite locally. The remarkably interesting Triassic reptile *Bathygnathus borealis* was found in the excavation for a well at New London. The soil of Prince Edward Island is remarkably fertile and well cultivated.

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37. Hoyt. At junction Devonian and Lower Carboniferous.

38. Watt Junction to McAdam Junction. Kames and moraines frequent, and in some places cut through by the railway.

39. Woodstock to Grand Falls. Fine examples of terraces.

40. Upper Woodstock. A blast-furnace erected here, and hæmatite ores from Jacksonton at one time smelted. Bricks manufactured from drift-clays.

41. Magog. At northern or lower end of Lake Memphremagog, a very picturesque sheet of water, much frequented as a summer resort. Orford Mountain, a dioritic intrusion to the northeast.

42. South Stukely. Numerous occurrences of copper-ore in this vicinity. The Huntington copper-mine six miles distant. The ore is chiefly chloritic slate and diorite, impregnated with copper pyrites, pyrrotite, and iron pyrites. Magnesite forms enormous beds in Bolton and neighboring townships, in association with serpentine, dolomite, etc. Chromic iron also found in serpentine. (Bolton, lot 4, range 2.)

44. St. Stephen, on New Brunswick Railway: thence granite ½ mile, Cambro-Silurian 1½ mile, granite 1 mile, Cambro-Silurian 16 miles to Watt Junction. On Grand Southern Railway: thence granite ½ mile. Cambro-Silurian 4½ miles to Oak Bay, then Silurian.

45. Yarmouth. Highly altered rocks, consisting of chloritic and hornblendic slates, clay slates, quartz rock, etc.

46. Metegan. From this point onward the rocks differ in appearance from those previously met with, and though colored, provisionally, on the general map of the Geological Survey as Cambrian, may be Cambro-Silurian or Silurian.

47. Bloomfield. Exposures of fossiliferous Oriskany of Bear River and Clements near here.

48. Digby. Good exposures of Triassic red sandstones and trappean rocks at Digby Gut and St. Mary's Bay. Digby Gut forms the entrance to Annapolis Basin, and is passed through by steamers, connecting with railway, for St. John.

49. Chamcook. Thence Silurian 2 miles, granite 4½ miles, Silurian 1½ miles.

50. Dyers. Cambro-Silurian 2 miles. Granite 8 miles. Near Dyers, kames may be observed.

Ms.	**Western Counties Railway, N. S.**	
0	Yarmouth.[45]	2–4. Cambrian.
5	Hebron.	"
7	Ohio.	"
10	Greencove.	"
13	Brazil Lake.	"
16	Lake Jessie.	"
18	Norwood.	"
21	Hectanooga.	"
30	Meteghan.[46]	4. Cambro-Silurian (?)
33	Saulmerville.	"
35	Little Brook.	"
37	Church Point.	"
41	Belliveau.	"
45	Weymouth.	5–7. Silurian (?)
51	Port Gilbert.	"
53	Plympton.	"
56	North Range.	"
58	Bloomfield.[47]	"
63	Jordantown.	"
67	Digby.[48]	16. Triassic.
	St. John.	
	Halifax.	

Chatham Branch Railway, N. B.

	Halifax.[3]	
0	Chatham.	14 b. Middle Carbonif.
9	Chatham Junc.	"
	Point Levis.	

Grand Southern Railway, N. B.

0	St. Stephen.[44]	Granite.
5	Oak Bay.	4. Cambro-Silurian.
14	St. Andrew's Crossing.	5–7. Silurian.
20	Dyer's.[50]	Granite.
29	Bonny River.	5–7. Silurian.
35	St. George.[51]	1. Pre-Cambrian.
44	Pennfield.[52]	"
54	New River.	"
—	Lepreaux.[53]	13 a. Lower Carbonif.
58	Lancaster.[54]	1 a. Laurentian.
67	Pr. of Wales.	"
70	Spruce Lake.	"
74	Carleton.	2. Cambrian.
82	St. John.[55]	"

Albert Railway, N. B.

0	Salisbury.	14 b. Middle Carbonif.
4	Coverdale.	"
10	Turtle Creek.	"
14	Baltimore.	"
16	Dawson.	"
17	Stony Creek.	"
20	Salem.	13 a. Lower Carbonif.
22	Weldon.[56]	"
24	Hillsboro.[57]	"
29	Albert Mines.[58]	"
31	Wilson.	"
33	Curryville.[59]	14 b. Middle Carbonif.
36	Cape.	"
38	Daniels.	13 a. Lower Carbonif.
40	Shepody.[60]	"
42	The Hill.	"
44	Riverside.	"
45	Albert.	"
48	Harvey.	14 b. Middle Carbonif.

51. St. George. About three miles north of St. George, on the Magaguadavic River, a red syenite is extensively quarried. Water-power is employed to drive the polishing machinery. The stone much resembles Aberdeen "granite," and is of very fine quality and color.

52. Pennfield. Large, broad kame, or "whaleback."

53. Lepreaux. Anthracite of an impure character occurs in Devonian beds about four miles south of station. The anthracite is very impure, but is interesting, being the only known instance in America of a Devonian coal.

54. Lancaster. Between this point and next station (Prince of Wales) line passes nearly along junction of Laurentian (to north) and Devonian. At Lancaster, kames.

55. St. John. Few points are of greater geological interest than the vicinity of St. John, where within a radius of a few miles rocks occur which have been assigned to the Laurentian, Pre-Cambrian, Cambrian, Devonian, and Lower Carboniferous formations. The city stands on hard, slaty rocks of the Acadian group, which yield Primordial fossils, in some places in considerable abundance. The Devonian rocks are well exposed on the shores of Courtney Bay, and also in the vicinity of Carleton. About a mile west of the last-named place, on the shore, are the "fern ledges," which have yielded a great number of fossil plants, with some insects and crustaceans. The Devonian rests quite unconformably on the Cambrian series, and is again overlain unconformably by the conglomerates of the Lower Carboniferous.

56. Weldon. Between this point and Hillsboro the Petitcodiac salt-marsh.

57. Hillsboro. Gypsum quarries in the Lower Carboniferous rocks.

58. Albert Mines. The mineral known as Albertite, an inspissated bitumen filling veins in the black shales of the Lower Carboniferous, was at one time extensively worked here. The mines are now closed.

59. Curryville. Gray sandstone quarries.

60. Shepody. Thence to Harvey principally salt-marsh.

61. New Glasgow. (See note No. 28, under Intercolonial Railway.)

62. French River. Lower Carboniferous in valley, hills on both sides of Silurian rocks.

63. Marshy Hope. Opposite this point, on the coast, good exposures of fossiliferous Silurian rocks of Arisaig group.

64. Antigonish. Interesting display of Lower Carboniferous rocks, including beds of limestone and gypsum in this neighborhood.

65. Cape Porcupine. On the shore of the Strait of Canso, 500 feet in height. The central mass a red syenite, against which rest slaty beds, supposed by Sir W. Dawson to be Silurian. On these, conglomerates of the Lower Carboniferous.

66. Strait of Canso Wharf. Interesting exposures of Lower Carboniferous rocks at Plaster Cove and other places on north side of Strait of Canso.

Ms.	Eastern Extension Railway, N. S.	
0	New Glasgow.[61]	14. Carboniferous.
5	Glenfalloch.	"
10	Merigomish.	"
13	French River.[62]	"
18	Piedmont.	5–7. Silur. or Cam.-Sil.
22	Avondale.	"
24	Barney's River.	"
27	Marshy Hope.[63]	"
31	James River.	13 a. Lower Carbonif.
35	Brierly Brook.	"
41	Antigonish.[64]	"
46	South River.	"
48	Taylor's Road.	"
51	Pomquet.	13 a. Lower Carbonif.
53	Heatherton.	"
56	Bayfield Road.	"
57	Afton.	"
61	Tracadie.	"
62	Girroirs.	"
66	Little Tracadie.	"
70	Harb. au Bouche	"
73	C. Porcupine.[65]	13 a. Lower Carb. 5–7. Silurian and Syenite.
79	Mulgrave.	13 a. Lower Carbonif.
80	S. of Canso, Wh'f.[66]	"

II. Ontario and Quebec.

List of the Geological Formations in Quebec and Ontario.[223]

20. Quaternary, 20 d. Saxicava Sand.*
20 c. Leda Clay.†
20 a. Boulder Clay or Till.
13. Lower Carbonif., 13 a. Bonaventure
8-12. Devonian, 12. Catskill (Ont.).‡
" 11. Chemung and Portage.§
" 10. Hamilton, including Marcellus and Genesee.
" 9. Corniferous or Upper Helderberg.
" 8. Oriskany.

5-7. Silurian, 7. Lower Helderberg.
" 6. Salina or Onondaga.
" 5 d. Guelph.
" 5 c. Niagara.
" 5 b. Clinton.
" 5 a. Medina and Oneida.
4. Siluro-Cambrian, 4 c. Hudson River
4 b. Utica.
4 a. Trenton.
3 c. Chazy.
2-3. Cambrian, 3 b. Sillery and Levis.
" 3 a. Calciferous.
" 2 c. Upper and Lower Potsdam.
" 2 b. Keweenian.
" 2 a. Animikie.
1. Eozoic or Archæan, 1 c. Huronian.
1 b. Norian or Labrador.
1 a. Laurentian.

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* In Central Ontario. 20 d. Algoma Sand and Artemisia Gravel.

† In Central Ontario. 20 c. Saugeen Clay; 20 b. Erie Clay.

‡ In Eastern Quebec. Scaumenac beds.

§ 8-12. Gaspé Sandstones, in eastern part of Quebec.

Ms.	Grand Trunk Railway. Portland to Montreal.		Alt.
0	Portland, Me.	1 c. Huronian.	14
5	Falmouth.	1 a. Laurentian.	51
9	Cumberland.	"	85
11	Yarmouth.	"	96
27	Danville Junc.	1 d. Montalban.	203
29	Lewiston Junc.	"	248
36	Mechanic's Falls	"	300
47	South Paris.	1 a. Laurentian.	392
70	Bethel.	"	654
80	Gilead.	1 d. Montalban.	716
86	Shelburne, N. H.	1 d. Montalban.	709
91	Gorham.	"	798
98	Berlin Falls.	Lake Group.	1022
122	Groveton Junc.	1 b. Huronion.	889
131	Breathes.	"	876
134	North Stratford.	"	901
142	Wenlock, Vt.	"	1151
149	Island Pond, Vt.	1 d. Montalban.	1187
165	Boundary Line.		1351
	Geology in U. S.	by Prof. Hitchcock.	

Grand Trunk Railway—*Con.*

Ms.	Lewiston Branch.		Alt.
29	Lewiston J., Me.	1 d. Montalban.	248
33	Taylor Brook.	"	205
34	Auburn.	"	148
35	Lewiston, Me.	"	140

Portland to Montreal.

Ms.			Alt.
165	Norton Mills, Quebec.[100]	Granite.	
169	Dixville.	5–7, Silurian.	1127
175	Coaticooke.	"	1007
180	Richby.	"	819
183	Compton.	"	734
186	Waterville.	"	646
193	Lennoxville.[101]	1. Pre-Cambrian.	500
196	Sherbrooke.[102]	"	486
203	Brompton Falls.	5–7. Silurian.	471
211	Windsor Mills.	"	420
221	Richmond.[103]	1. Pre-Cambrian.	391
228	Lisgar.	"	529
231	Durham.[104]	2–3. Cambrian.	609
235	Danby.	"	438
243	Acton Vale.[105]	"	312
249	Upton.	"	204
252	St. Liboire.	"	
255	Britannia Mills.	4 a. Trenton.	222
257	St. Rosalie.	4 c. Hudson River.	
262	St. Hyacinthe.	"	111
269	St. Madeleine.	"	119
275	St. Hilare.[106]	"	86
276	Belœil.	"	63
280	St. Brazile.	"	
282	St. Bruno.	"	98
287	St. Hubert.[107]	"	91
290	St. Lambert.	4 b. Utica.	76
297	Montreal.[210]	" (Bonaventure Station).[51]	

Grand Trunk Railway—*Con.*

Ms.	Montreal, Richmond, and Quebec.[108]		Alt.
0	Point Levis[23] (op. Quebec).[24]	2–3. Cambrian.	14
7	Chaudiere Curve	"	229
9	Chaudiere Junc.	"	
15	Craig's Road.	"	335
20	St. Agapit.	"	406
28	Methot's Mills.	"	444
37	Lyster.	"	446
41	St. Julie.	"	475
49	Somerset.	"	442
55	Stanfold.	"	128
64	Arthabaska.	"	430
71	Warwick.	"	481
79½	Kingsey.	"	444
84	Danville.	"	
98	Richmond.	1. Pre-Cambrian.	391
137	St. Hyacinthe.	4 c. Hudson R.	111
172	Montreal.[210]	4 b. Utica (at Bonaventure Station).[51]	

Arthabaska and Three Rivers Branch.

Ms.			Alt.
0	Arthabaska.	2–3. Cambrian.	430
4	Walker's Cutting.	"	
11	Bulstrode.	"	
18	Aston.	"	
25	St. Celestin.	5 a. Medina and Oneida.	
31	St. Gregoire.	4 c. Hudson R.	
35	Three Rivers.	"	

Champlain Division.

Ms.			Alt.
0	Montreal.[210]	4 b. Utica (at Bonaventure Station).	
7	St. Lambert.	"	
12	Brosseau's.	"	
20	Lacadie.	"	

100. The portion of the province included between the 45th parallel and Maine boundary and the St. Lawrence, generally designated the "Eastern Townships," has given rise to more discussion and difference of opinion between geologists than any other part of the Dominion. It is naturally a region of extreme geological complexity and disturbance, and can scarcely yet be considered as fully worked out. For a work like the present it is necessary, however, at least to denote the formations on one uniform system, whatever doubt may attach to the reference of some of them. For this purpose, Dr. Selwyn has kindly allowed the use of unpublished sheets, colored according to his views.

This district is the continuation northward of the Appalachian region. One of its most salient features is the great Champlain and St. Lawrence fault, which separates the undisturbed rocks of its northwestern from the plicated beds of its southeastern part. This great fracture runs from the head of Lake Champlain to Quebec and beyond. (See Note 8, New York.)

101. Lennoxville. The Hartford Mine, from which a great quantity of copper-ore has been extracted, is situated at a distance of five miles from this station. The ore is granular iron pyrites, mixed with copper pyrites.

102. Sherbrooke. Numerous occurrences of copper-ore in this vicinity and near Lennoxville. A bed of jasper in the town of Sherbrooke.

103. Richmond. The Rockland and Melbourne slate quarries are within a few miles of this station. The slates here have been somewhat extensively worked, and are unsurpassed in quality. A few miles south of Richmond, in Melbourne, fine serpentine marbles occur.

104. Durham. The line between the Pre-Cambrian and Cambrian rocks is crossed at South Durham.

105. Acton Vale. A very productive mine of variegated and vitreous copper-ore, occurring in brecciated portions of a limestone-bed, was formerly worked here, but is now abandoned. Slate quarries also in this vicinity.

106. St. Hilaire. Belœil Mountain, one of the remarkable igneous protrusions which penetrate the flat-lying Silurian rocks of the St. Lawrence Valley, may be visited from this point. The mountain is partly composed of augite-syenite and partly of nepheline-syenite. An excellent summer hotel on the mountain. (See Note 210 on Mount Royal, Montreal.)

Grand Trunk Railway—

Champlain Division—*Con.*

Ms.		
27	St. Johns.[109]	4 b. Utica.
33	Grande Ligne.	“
39	Stottsville.	“
44	Lacolle.	“
50	Rouse's Pt., N.Y.	“

Montreal and Province Line.

Ms.		
0	Montreal.[210]	4 b. Utica (at Bonaventure Station).
6½	St. Lambert.	“
12	Brosseau's.	“
14	Laprairie.	“
20	St. Constant.	4 a. Trenton.
23	St. Isidore Junc.	3 a. Calciferous.
27	St. Regis.	“
33	St. Martine.	2 c. Potsdam.
38	Howick.	“
44	Bryson's.	3 a. Calciferous.
47	Ormstown.	“
56	Huntingdon.	“
64	White's.	“
74	Ft.Covington, N.Y.	“
30	St. Remi.	4 a. Trenton.
34	St. Michel.	“
37	Hughe's.	3 a. Calciferous.
39	Johnson's.	“
44	Hemmingford.	“
47	Province Line.	“
50	Moore's J., N.Y.	2 c. Potsdam.

Central Vermont Railway.

Northern Division.

Ms.		
0	Montreal.[210]	
0	St. Johns.[109]	4 b. Utica.
7	Verselles.	“
10	St. Brigede.	4 c. Hudson River.
14	W. Farnham.	4 a. Trenton.
21	Angeline.	2–3. Cambrian.
29	Granby.	“
37	W. Shefford.[110]	“
43	Waterloo.	1. Pre-Cambrian.
0	Montreal.[210]	
27	St. Johns.[109]	4 b. Utica.
36	St. Alexandre.	“
42	Des Rivières.	4 c. Hudson River.
45	Stanbridge.[111]	“
52	St. Armand.[112]	2–3. Cambrian.
57	Highgate Sp'gs,	3 b. Levis Limestone.
61	E. Swanton. [Vt.	2 b. Potsdam Slate.
64	Swanton Junc.	“
70	St. Albans.	“

Quebec and Lake St. John Railway.

Ms.		
0	Quebec.[24]	4 c. Hudson River.
4	Junction.	“
5	Little River.	“
8	Ancine Lorette.	“
10	St. Ambrois.	1 a. Laurentian.
14	Valcartier Sta.	“
16	Jacques Cartier.	“
17	St. Gabriel.	“
23	St. Catharines.	“
24	Lake St. Joseph	“
27	Lake Sergeant	“
30	Bourg Louis	“
36	St. Raymond.	“
39	Côtes Road.	“
43	River Roudeau.	“
46	Lake Simon.	“
86	Lake Edward.	“

North Shore Railway.[113]

Ms.		
0	Quebec.[24]	
4	Lake St. John Railway Junc.	4 c. Hudson River.
7	Lorette.	“
13	Belair.	“
25	Point Rouge.	4 a. Trenton.
30	St. Bazile.	4 b. Utica.
34	Portneuf.	“
38	Deschambault.	“ or 4 a. Trenton.
42	Lachevrotiere.	4 a. Trenton.
45	Grondines.	“
52	Ste. Anne le Perade.	4 b. Utica.
57	Batiscan.	4 c. Hudson River.
64	Champlain.	“
74	Piles Branch Jn.	“
77	Three Rivers[114]	“
85	Pointe du Lac.	“
92	Yamachiche.	“
97	Louiseville.	4 b. Utica.
101	Maskinonge.	“
107	St. Barthelemi.	“
111	St. Cuthbert.	“
115	Berthier Junc.	“
123	Lanoraie.	4 c. Hudson R. or Utica.
129	La Valtrie.	4 b. Utica.
132	L'Assomption.	“
136	L'Epiphanie.	“
144	St. Henri Mascouche.	4 a. Trenton.
148	Terrebonne.[115]	“
154	St. Vincent de Paul.	“
159	St. Martin Jn.	3 c. Chazy.
170	Hochelaga.	4 a. Trenton.
171	Montreal.[210]	“

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107. St. Hubert. Extensive peat-bogs in this vicinity, from which a considerable quantity of peat was at one time extracted and manufactured.

108. Montreal, Richmond and Quebec. This road passes for the most part over an alluvial country, in general thickly drift covered, and little is seen of the underlying rocks, except in the neighborhood of Richmond. (See Note 103.)

109. St. Johns. Pottery-works. Rough earthen-ware articles are manufactured from clay underlying the town. The clay is marine (leda clay), twenty-two feet in thickness, and covered by one foot of soil.

North Shore Railway—*Con.*

Piles Branch.

Ms.		
0	Three Rivers.	4 c. Hudson River.
2	Piles Branch Jn.	“
9	St. Maurice.[116]	4 b. Utica & 4 a. Trenton.
21	Lac a la Torgue.	1 a. Laurentian.
29	Grand Piles.[117]	“

Berthier Branch.

	Berthierville.	4 c. Hudson River.
	Berthier Junc.	4 b. Utica.

Quebec Central Railway.

Ms.		
0	Sherbrooke.[118]	1. Pre-Cambrian.
4	Lenoxville.	“
10	Ascot.	“
19	Basin.	5–7. Silurian.
27	Dudswell.[119]	“
36	Weedon.	“
47	Garthby.[120]	“
57	Coleraine.	“
67	Thetf'dMin's[121]	1. Pre-Cambrian.
78	Broughton.[122]	“
91	St. Frederic.	“
100	Beauce.	“
105	St. Joseph.[123]	2–3. Cambrian.
110	Scotts.	“
122	St. Anselme.	“
139	Levis.	“

The Bay of Quinte Railway.

Ms.		
	Deseronto.	4 a. Trenton.
	East End.	“
	Deseronto Junc.	“
	Napanee.	“

Northern and Northwestern Railways.

Ms.		
0	Port Dover.[124]	9. Cornif. and 8. Oriskany.
9	Jarvis.	“
12	Garnett.	“
14	Hagersville.	“
16	Ballsville.	6. Onondaga.
24	Caledonia.	“
29	Glanford.	5 d. Guelph.
34	Rymal.	“
40	Hamilton.[125]	5 a. Medina and Oneida.
48	Burlingt'n B'ch.	“
51	Burlington.	“
57	St. Ann's.	5 c. Niagara (?)
59	Zimmerman.	5 a. Medina and Oneida.
66	Milton.	“
75	Stewarton.	“
77	Georgetown Jn.	“
77	Georgetown.	“
79	Glenwilliam.	“
81	Salmonville.	“
83	Cheltenham.	“
86	Riverdale.	“
93	Caledon East.	“

110. Shefford. The railway here passes close to Shefford Mountain, an intrusive mass described as a granitoid trachyte. A larger mass of similar trachyte forms Brome Mountain to the south.

111. Stanbridge. Bog-iron-ore in considerable quantity in this vicinity. Formerly worked.

112. St. Armand. The limestone belt between this place and Phillipsburg affords several varieties of marble of different colors. Some of these have been quarried. A black marble occurring a mile and a half southeast of Phillipsburg is particularly worthy of note.

113. The line, for the greater part of its length, is at no great distance from the north bank of the St. Lawrence, and, owing to the depth of the drift deposits and alluvium, but little of the geological structure of the county can be seen. The outlines of the formations, as represented on the geological map of Canada, are somewhat uncertain for the same reason, and must at present be considered as approximations only.

114. Three Rivers. The railway here crosses the St. Maurice, a river important from a lumbering point of view, and having a total course of about three hundred miles. The Shawanagan Falls, on the St. Maurice, twenty-one miles distant, one hundred and sixty feet in height. The falls occur over Laurentian rocks, and are very picturesque. On the river below the falls the Potsdam sandstones may be observed to overlie the Laurentian. Extensive brick-yards at Three Rivers.

115. Terrebonne. Quarries. Chazy limestone. Stone taken to Montreal in scows, and has been extensively used in enlargement of Lachine Canal.

116. St. Maurice. Iron smelting, on a small scale, has been in operation here for one hundred and fifty years. The mineral employed is bog-iron-ore.

117. Grand Piles. Navigation by steamer on the St. Maurice from this point northward, into the heart of the Laurentian country.

118. Sherbrooke. (See Note 102 under Grand Trunk, Montreal to Portland.)

119. Dudswell. About three miles northward, yellow and gray marbles capable of receiving a good polish, and highly ornamental.

120. Garthby. Deposit yielding native antimony, antimony glance, and other minerals, five miles from Garthby, in South Ham, lot 28, range 1. Lot 22, range (north) 1, Garthby ; extensive deposit of iron and copper pyrites.

121. Thetford Mines. Asbestos extensively worked. The veins occur in association with serpentine rocks, which here characterize a considerable tract of country.

122. Broughton. The Harvey Hill Copper Mine, at one time extensively worked, but at present suspended, near here. Purple copper-ore, copper glance, and copper pyrites, occur in veins cutting the strata and beds conformable with the stratification.

123. St. Joseph. On the Chaudiere River. Gold occurs in placer deposits in numerous localities in this vicinity. These deposits have been worked to some extent, but are as yet imperfectly developed, as the auriferous alluviums are known to extend over an area of ten thousand square miles. The Kilgour nugget, found on the Gilbert River, weighed 51½ ounces. A handsome brecciated marble found on the Rivière Guilliaume near here.

124. Port Dover. Corniferous limestones, with pores of corals frequently filled with petroleum. Epsonites occur in limestones on the lake shore.

125. Hamilton. A band of sandstone known as the "gray band," and referable to the Medina formation, is quarried here and used in building.

Northern and Northwestern Railways— *Continued.*

Ms.		
96	Centreville.	4 c. Hudson River.
99	Palgrave.	"
105	Tottenham.	"
110	Beeton.	"
114	Thompsonville.	4 b. Utica.
116	Alliston.	"
120	Everitt.	"
123	Tioga.	4 a. Trenton.
126	Lisle.	"
129	Glencairn.	"
151	Collingwood.[126]	"
135	Allandale.	"
—	Barrie.	"

Beeton and Barrie Branch.

0	Beeton.	
—	Beeton Junc.	
9	Cookstown.	4 b. Utica.
14	Thornton.	4 a. Trenton.
19	Victoria.	"
25	Allandale.	"
—	Barrie.	"

North Simcoe Branch.

0	Allandale.	4 a. Trenton.
5	Colwell.	"
13	Minesing.	"
16	Hendrie.	"
19	Phelpston.	"
24	Elmvale.	"
26	Saurin.	"
30	Wyevale.	"
39	Penetang.	"

Allendale to Muskoka Wharf.

63	Allandale.	4 a. Trenton.
64	Barrie.	"
70	Gowan.	"
74	Oro.	"
78	Hawkstone.	"
87	Orillia.	"
90	Atherly.	"
95	Longford.	1 a. Laurentian.
100	Washago.	"
103	Severn.	"
109	Lethbridge.	"
115	Gravenhurst.	"
116	Muskoka Wharf	"

Passumpsic Railway.

Ms.	Quebec to Newport.	
	Quebec.	
	Montreal.	
	(S. E. R'y.)	
0	Sherbrooke.[102]	1. Pre-Cambrian.
3	Lenoxville.	"
8	Capleton.	1. Pre-Camb. & 2–3. Sil.
12	North Hatley.	"
19	Massawippi.	5–7. Silurian.
21	Ayer's Flats.	"
27	Libby Mills.	"
30	Smith's Mills.	"
34	Stanstead Jn[127]	Granite.
40	Newport, Vt.	5–7. Silurian.

South Eastern Railway.

Main Line.—Montreal to Richford, Vt.

0	Montreal.[210]	
0	Longueuil.	4 b. Utica.
2	St. Lambert.	"
12	Chambly Basin.	4 c. Hudson River.
13	Chamb. Canton.	"
14	Richelieu.	"
19	Marieville.	"
22	St. Angele.	"
26	St. Brigide.	"
32	Farnham.	4 a. Trenton.
37	Farndon.	2–3. Cambrian.
39	Brigham.	"
42	East Farnham.	"
45	Cowansville.	"
47	Sweetsburg.	"
50	West Brome.	1. Pre-Cambrian.
55	Sutton Junc.	"
58	Sutton.	"
63	Ambercorn.	"
66	Richford, Vt.	1 b. Huronian.

Northern Division.

0	Sorel.	4 c. Hudson River.
6	St. Robert.	"
10	Yamaska.	"
14	St. David.	"
21	St. Guillaume.	"
27	Boulogne.	"
32	St. Germain.	2–3. Cambrian.
36	Drummondville.	"
45	Wickham.	"
54	Acton.[105]	"

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126. Collingwood. The Utica shales may here be observed to overlap the Trenton. These shales were at one time distilled here for oil.

127. Stanstead Junction. A considerable area of granite here, surrounded by dikes of the same material which penetrate the calcareous strata. The granite is excellent for building purposes.

128. Brome. About four miles southwest, iron-ores (specular schists) at one time worked. (See Note 110 on Brome Mountain, under Central Vermont Railway, Shefford.)

129. Sutton. Similar iron-slates to that above described in a number of places near here.

130. Abbotsford. Yamaska Mountain to the southeast, an intrusive mass about three miles in diameter, is for the most part a micaceous trachyte rock. The southeastern portion is, however, a diorite.

131. Rougemont. The intrusive mass forming the mountain of Rougemont is chiefly composed of olivine-diabase. This is one of a group of similar intrusions of which Mount Royal and Belœil Mountain may be taken as typical.

South Eastern Railway—

Northern Division—*Con.*

Ms.		
60	Roxton Falls.	2–3. Cambrian.
67	South Roxton.	"
71	Savage's Mills.	"
77	Warden.	1. Pre-Cambrian.
80	Waterloo.	"
84	Foster.	"
88	Knowlton.	"
92	Brome Cent.[128]	"
96	Sutton Junc.[129]	"

Champlain Division.

Ms.		
0	Stanbridge.	2–3. Cambrian.
2	Bedford.	"
15	Mystic.	"
14	Farnham.	4 a. Trenton.
20	L'Ange Gardien.	4 a. Trenton and 4 c. Hudson River.
—	Papineau.	"
26	Abbottsford.[130]	"
31	St. Pie.	"
39	St. Hyacinthe.	4 c. Hudson River.
41	St. Rosalie Jn.	"
48	St. Simon.	"
53	St. Hugues.	"
61	St. Guillaume.	"

St. Cesaire Branch.

Ms.		
0	St. Cesaire.	4 c. Hudson River.
4	Rougemont.[131]	"
8	Marieville.	"

St. Lambert to Longueil.

Ms.		
0	St. Lambert.	4 b. Utica.
2	G. T. Crossing.	"
6	Longueil.	"

Central Ontario Railway.

Ms.		
	Trenton Junc.	4 a. Trenton.
	Trenton.	"
6	Carrying Place.	"
11	Consecon.	"
16	Hillier.	"
18	Four Corners.	"
21	Wellington.	"
25	Stinson's Creek.	"
28	Bloomfield.	"
32	Picton.	"

Grand Trunk Railway.

Montreal to Toronto and Detroit.

Ms.			Alt.
0	Montreal.[210]	4 a. Trenton, 14 m.	51
8	Lachine Jun.	"	
14	Pointe Claire[132]	4 a. Black River.	109
21	Ste. Anne.[133]	2*b. Potsd. & Calcif.	124
24	Vaudreuil.[134]	2 b. Potsdam, 12 m.	93
31	St. Dominique.	"	
37	Coteau Land'g.	3 a. Calc. 3 c. Chazy.	161
48	Bainsville.	3 c. Chazy, 33 miles.	
54	Lancaster, Ont[135]	3 a. Calciferous.	165
59	Summertown.	3 a. Calcif. & 3 c. Chazy.	
67	Cornwall.	3 a. Calciferous, 5 m.	192
72	Mille Roches[136]	4 a. Trenton, 2 miles.	
77	Dickinson.	3 c. Chazy, 30 miles.	
81	Farran's Point.	"	242
92	Morrisburg.	"	
99	Iroquois.	3 c Chazy.	243
104	Edwardsburg.	3 a. Calciferous.	277
112	Prescott Jun.	"	303
112	Prescott Jun.	3 a. Calciferous, 45 m.	303
164	Ottawa.[216]	3 c. Chazy, 7 miles.	
115	Gladstone.	3 a. Calciferous.	
120	Maitland.	"	
125	BROCKVILLE.[137]	2 b. Potsdam.	281
129	Lyn.[138]	"	286
138	Mallorytown.	1 a. Laurentian.	336
147	Landsdowne.	" 34 m.	334
155	Gananoque.[139]	"	261
162	Ballantyne's.	"	361
169	Rideau.	3 a. Calciferous.	303
172	KINGSTON.[140]	4 a. Black River.	274
180	Collins' Bay.	4 a. Trenton, 114 miles.	
194	Fredericksb'rg.	"	
198	Napanee.	"	
213	Shannonville.	"	
223	BELLEVILLE.	"	286
232	Trenton.	"	265
241	Brighton.	"	304
249	Colborne.	"	322
256	Grafton.	"	
264	COBOURG.	"	297
270	PORT HOPE.	"	287
279	Newtonville.	"	294
286	Newcastle.	"	296
290	Bowmanville[141]	4 b. Utica, 24 m.	263
294	Saxony.	"	380
299	Oshawa.	"	333

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132. Pointe Claire. Black River limestones in quarry near station. Highly fossiliferous. Much of the stone for the piers of the Victoria Bridge was quarried here.

133. St. Anne. The west point of the island of Montreal is composed of Potsdam sandstone, which is seen in the immediate vicinity of the station. Just east of this a belt of calciferous occurs, and here yields some characteristic fossils. *Scolithus Canadensis* may be found in the Potsdam. The Potsdam forms an anticlinal, and underlies the county for about eight miles westward, when it is followed by a second belt of Calciferous. On the opposite side of Lac St. Louis, at Beauharnois, six miles from St. Anne, *Protichnites* in sandstone quarries.

134. Vaudreuil. In the seigniory of Vaudreuil bog-iron-ores occur in several places, particularly at Côte St. Charles.

135. Lancaster. From this point to Cornwall the railway nearly follows the line of junction of the Calciferous and Chazy formations.

136. Mille Roches. Quarries in Trenton limestone affording good building-stone. Some beds, when polished, resemble black marble.

137. Brockville. Cliffs on the river below Brockville show good sections of the Potsdam beds, and on the river, two and a half miles above that place, an outlyer of this formation occurs, the basal conglomerate of which may be seen resting on the Laurentian. In cutting of Brockville and Ottawa [illegible] 20 – 30 ft. (See below.)

Georgetown to Ailsa Craig, mostly flat, lac. till, partly strat. with few bs., like No. 1 above;

Thedford to Ailsa Craig and 15 ms. W., flat lac. mod. dr. — nearly all clay — no stones or very few.

Thedford to Blackwell till, like Nos. 1 and 3. overlain at Forest by strat. gr. and sand, all flat.

Grand Trunk Railway—

Ms.	Montreal to Toronto and Detroit—*Con.*		
303	Whitby.	4 b. Utica.	268
310	Pickering.	"	287
316	Port Union.	4 c. Hudson Riv, 44m.	266
324	Scarboro Jun.	"	546
333	TORONTO. Beach, 15 ft., at Carlton	"	254
341	Weston.	"	426
354	Brampton.	5 a. Medina, 11 m.	713
362	GEORGETOWN.	"	847
365	Limehouse.[142]	5 c. Niagara.	1057
368	Acton West[143]	" Moraine, 1/2 or 2 m. W. of Acton.	1159
374	Rockwood.[144]	"	1183
381	GUELPH.[145]	5 d. Guelph.	1068
386	Balmoral. 1/2 m. W. of Guelph (N.W.–S.E.)	"	1085
391	Breslau.	"	1025
396	Berlin.	6. Onondaga, 14 m.	1101
403	Doon.	5 a. Guelph.	
408	Galt.[159]	"	880
402	Petersburg.	6. Onondaga.	1211
405	Baden.	7 & 8. Corn. 16 m. & Oris-	
421	STRATFORD.	" " [kany.	1157
421	STRATFORD.	" " 33 m.	1190
432	St. Mary's.	" "	1083
444	Thorndale.	" "	936
454	LONDON.	" "	815
421	STRATFORD.	" " 26 m.	1190
432	St. Mary's.	" "	1083
447	Lucan	" "	991

Grand Trunk Railway—

Ms.	Montreal to Toronto and Detroit—*Con.*		
454	Ailsa Craig.	10 b. Hamilt., 23 m.	754
461	Park Hill.	"	663
470	~~Widder.~~[147] — now Thedford (Till)		682
479	Forest.	11b. Chemung, 91 m.	712
496	Blackwell.	"	602
501	SARNIA.	"	587
502	P. Huron, Mich.	"	588
512	Ch. & L. H. Jun.	"	623
557	Milw. Junc.	"	
561	Detroit Junc.	"	594
564	DETROIT.	10 b. Hamilton, 3 m.	581
	Buffalo to Goderich and Detroit.		
0	BUFFALO.	9. Corniferous, 32 m.	588
2	Fort Erie.[146]	"	
19	Port Colborne.	"	
32	Feeder.	6. Salina, 60 miles.	
38	Dunnville.	"	
59	Caledonia.	"	
68	Onondaga.	"	
76	BRANTFORD.[148]	"	706
84	Paris.[149]	"	
82	Drumbo.	"	
97	Bright.	9. Corniferous, 68 m.	
115	STRATFORD.	"	1190
128	Mitchell.	"	
139	Seaforth.[150]	"	
148	Clinton.[151]	"	
160	GODERICH.[152]	"	730

Flat lac. str. clay

Railway, blue boulder-clay overlaid by brownish clay. An important deposit of iron pyrites in Elizabethtown, near Brockville. Acid-works.

138. Lyn. Potsdam sandstone of good quality for building. A portion of the stone for the Parliament buildings at Ottawa was quarried here.

139. Gananoque. Quarry of red syenite on island opposite this place. The stone takes a good polish and is used for monuments, etc.

140. Kingston. Clays seen in railway cuttings near Kingston probably represent the *Saugeen clays*, a series overlying the Erie clays. These rest on a glaciated limestone surface. In one of the cuttings Silurian beds, conglomeritic, etc., and possibly Calciferous in age, are seen resting on Laurentian gneiss. The Trenton (?) here affords good building-stone. Kingston is familiarly known as "The Limestone City." A considerable quantity of apatite is brought out here from points in the vicinity of the Rideau Canal.

141. Bowmanville. Quarry in upper part of Trenton limestone.

142. Limehouse. Materials derived from the Clinton formation employed in manufacture of mineral pigments. R. R. cuts rock; quarries near. (from Georgetown west). yellowish fertile

143. Acton West. Artemisia gravels thirty miles — Only coarse (1 ft. or +) and fine, mod. dr.; also some till; freq. Exps. of bed-rock

144. Rockwood. Considerable display of upper part of Niagara limestone in this vicinity. From Rockwood the slope of the country westward is at about the same rate with the dip of the beds, so that on arriving at Guelph we should be nearly on the same horizon as at the first-mentioned locality.

Rolling 25–50 ft.

145. Guelph. Quarries in the Guelph formation yielding building-stone (dolomite) of a superior character. Casts of fossils.

146. The portion of this province lying between the Great Lakes, and generally designated the "Ontario Peninsula," is geologically an extension of the rock-series of the adjacent portion of the State of New York, its formations showing throughout a close correspondence to those of that State. The separation marked by the lakes and Niagara River is to be regarded rather as accidental than structural. The greater part of the surface of this portion of the province is heavily covered by deposits due to the glacial period, of which local details sufficiently precise for mention in connection with the actual lines of railways are frequently wanting.

These superficial deposits only are often seen for considerable distances along the railways.

The boulder-clay, which is thick and almost universal, is overlaid by stratified clays (Erie clays), which have not been found to hold marine fossils. The clays with marine shells, which occur in the eastern extremity of Ontario and in the Ottawa Valley, are an extension of those of the Province of Quebec, elsewhere described.

The Saugeen clays have been distinguished as an upper portion of the Erie clays, and are locally unconformable on them. They are brownish and calcareous, with beds of sand. North of Lake Huron, and between Georgian Bay and the Ottawa River, the clays are overlain by the Algoma sands, of which the Artemisia gravels, covering a considerable area in the Ontario Peninsula, are possibly a local development. Thedford. (or perhaps a few ms. E. of Blackwell)

147. ~~Widder.~~ Near the station a cutting shows forty feet of the Hamilton formation. The rocks

The six miles from Blackwell to Pt. Edward and Sarnia are sand, moderately undulating [illegible]

Ms.	Canada Southern Railway.		Alt.
0	BUFFALO.	9. Corniferous, 2 m.	573
6	Victoria.[146]	6. Onondaga, 58 m.	607
8	Niagara Junc.	"	608
23	Welland.	"	589
32	Perry.	"	590
47	CANFIELD.	"	621
54	Dean's.	"	637
64	Hagersville.	9. Corniferous, 64 m.	740
72	Villa Nova.	"	732
83	Windham.	"	817
99	Tilsonburg.[166]	"	806
111	Springfield.	"	796
124	ST. THOMAS.	10. Hamilton, 74 m.	766
128	ST. CLAIRE JN.	"	765
137	Iona.	"	745
150	Bismarck.	"	711
162	Highgate.	"	739
187	Buxton.	"	602
198	Tilbury.	"	592
204	Comber.	9. Corniferous, 48 m.	604
213	Woodslee.	"	619
227	Colchester.	"	611
235	AMHERSTBURG.	"	600
236	Grosse Isle.	"	
239	Trenton.	"	
256	DETROIT.	10. Hamilton, 10 m.	580
0	Buffalo.	9. Corniferous.	573
8	Niagara Junc.	6. Onondaga.	608
19	Black Creek.	5 d. Guelph.	568
25	Chippewa.[154]	5 c. Niagara.	
28	Clifton.[155]	"	
29	Susp. Bridge[146]	"	547
35	Queenston.	5 a. Medina.	
42	Niagara.	"	

Ms.	Grand Trunk Railway. Great Western Division.		Alt.
	SUSP. BRIDGE.		547
0	Clifton.[155]	5 c. Niagara, 9 m.	
9	Thorold.[169]	"	
11	St.Cath'rines[168]	5 a. Medina, 34 m.	357
27	Grimsby.[156]	"	287
43	HAMILTON.	"	255
43	HAMILTON.	5 a. Medina, 32 m.	255
45	Toronto Junc.	"	305
56	Bronte.	"	
69	Port Credit.	4 c. Hud. Riv., 7 miles.	
75	Mimico.	"	
82	TORONTO.	"	
43	HAMILTON.	5 b. Clinton.	255
49	Dundas.[157]	5 c. Niagara. 5 b. Clinton.	517
55	Copetown.[158]	5 d. Guelph.	749
59	Lynden.	"	751
62	HARRISBURG.	"	734
65	St. George.	"	
67	Dumfries.	6. Onondaga.	
72	PARIS.	" Grav. ridge.	842
79	Princeton.	"	932
84	Governor's.	9. Corniferous.	967
91	Woodstock.	"	957
110	Dorchester.	"	852
119	LONDON.	"	806
129	Komoka.	10 b. Hamilton, 26 m.	811
140	Longwood.	"	752
145	Appin.	11 b. Chemung, 23 m.	743
156	Newbury.	"	702
168	Thamesville.	10 b. Hamilton, 25 m.	623
183	Chatham.	"	598
198	Prairie.	9. Corniferous, 36 m.	595

are soft marly clays with thin limestone beds, and are highly fossiliferous, yielding *Spirigera mucronata*, *Atrypa reticularis*, *Spirigera concentrica*, etc.

148. Brantford. Erie clay used in manufacture of white brick. Artemisia gravels twenty miles.

149. Paris. Gypsum quarried in a number of places in this vicinity. Two beds, each four or five feet in thickness, separated by four feet of shale.

150. Seaforth. Salt-works. Brines from the Onondaga formation employed.

151. Clinton. Salt found in boring at 1,180 feet.

152. Goderich. In cliffs on the Maitland River, near Goderich, sections of Corniferous formation —sandstones and limestones—in some places fossiliferous. In 1865 brine was discovered at Goderich, in a boring made with the hope of obtaining petroleum. In the next three years several wells were sunk here and in the vicinity, the salt being derived from the Onondaga formation. In 1867 Mr. Attrill effected a boring of 1.517 feet, for the purpose of ascertaining the amount and character of the rock-salt which had been reached in some of the wells made before that date. This boring showed a total thickness of 126 feet of rock-salt in 520 feet of strata. Dr. Hunt conducted analyses of the specimens obtained, and proved that some of the beds are extremely pure. He calculates at 880,000 bushels to the acre, the yield of salt from the best white layer of ten and a half feet in thickness. The area underlaid by these salt deposits does not extend as far north as Teeswater, but appears to have a considerable extension southward. Owing to difficulties met with in sinking a shaft to the rock-salt, the beds have not yet been worked, though a large quantity of excellent salt—particularly suitable for dairy use—is manufactured from the brines.

153. Brantford. (See Note 148 under Buffalo to G. and D.) Artemisia gravels thirty-five miles.

154. Chippewa. Base of Onondaga probably in this vicinity, but whole country covered by clays.

155. Clifton. In the slope and precipice over which the Niagara Falls occur, the whole thickness of the Niagara formation is included. On Goat Island fresh-water sands are found overlying the boulder-clay, and on the Canadian side sixteen species of fresh-water and land shells have been found in similar sands. (See Notes 39 and 42 in New York.)

156. Grimsby. Quarries in Niagara limestone and sandstone.

157. Dundas. Close to station, on north side, a fine section of Niagara and Clinton. Quarries. Great thickness of Quaternary clays in this vicinity. North of the town a gravelly ridge or shore deposit 818 feet above the lake. Brick-yards.

158. Copetown. Summit of Niagara escarpment.

159. Galt. Good exposures of Guelph formation with fossils. Quarries yielding magnesian limestone suitable for building.

160. Preston. Good sections of Guelph formation. Fossils.

Grand Trunk Railway—

Great Western Division—*Con.*

Ms.			
207	St. Clair.	9. Corniferous.	
221	Tecumseh.	“	590
229	WINDSOR.	“	582
230	DETROIT.	10 b. Hamilton, 1 m.	

Great Western Railway Air Line.

0	Buffalo.	9. Corniferous, 75 m.	
16	Welland.[146]	“	
72	Simcoe.	“	
81	Delhi.		
99	Corinth.	(See Loop Line, on page 67.)	
102	New Sarum.		
117	St. Thomas.		
136	Baird's.		
130	Lawrence.		
145	GLENCOE.	11b. Chemung, 2 m.	
224	Windsor.		
225	Detroit.		

Northern Railway of Canada.

0	TORONTO.	4 c. Hud. Riv., 24 m.	247
14	Thornhill.	“	633
18	Richmond Hill.	“	847
22	King.	“	955
30	Aurora.	4 b. Utica, 14 m.	
34	Newmarket.	“	772
38	Holland.	“	743
49	Gilford.	5 d. Guelph, 34 m.	753
52	Lefroy.	“	779
57	Bramley.	“	888
63	Allandale.	“	738
74	Angus.	4 b. Utica.	627
86	Stayner.	“	717
94	COLLINGWOOD.	“	590
105	Meaford.	4 c. Hud. Riv., 16m.	674

Kingston and Pembroke Railway.

0	Mississippi.	1 a. Laurentian.
10	Oso.	“
14	Sharbot Lake.	“
18	Olden.	“
22	Parham.	“
29	Hinchinbrooke.	“
31	Bedford.	“
35	Verona.	“
39	Hartington.	Birdseye & Black River.
42	Harrowsmith.	4 a. Trenton.
47	Murvale.	“
51	Glenvale.	“
59	G. T. Junction.	Birdseye & Black River.
61	Kingston.	“

Cobourg, Peterborough, and Marmora Ry.

	Cobourg.	4 a. Trenton.
	Baltimore.	“
	Summit.	“
	Harwood.	“

International Railway.

Ms.		
0	Sherbrooke.[102]	1. Pre-Cambrian.
	Lennoxville.	“
	Johnville.	5–7. Silurian.
	Bulwer.	“
	Birchton.	“
	Cookshire.	“
	Robinson.	“
	Gould.	“
	Scotstown.	“
	McLeod's Cross.	“
	Marsden.	“
	Springhill.	“
	Sandy Bay.	“
69	Lake Megantic.	“

Grand Trunk Railway.

Georgian Bay and Lake Erie Division.

0	Wiarton.	5 c. Niagara, 4 m.
8	Hepworth.	5 d. Guelph, 20 m.
15	Allenford.	“
20	Tara.	“
33	Chesley.	6. Onondaga.
36	Elmwood.	“
44	Hanover.	“ Artem. gr'vels.
50	Neustadt.	“
64	Harriston.	“
69	Palmerston.	“

0	Palmerston.	6. Onondaga.
11	Mount Forrest.	5 c. Guelph.
17	Holstein.	“
22	Varney.	“
26	Durham.	“

69	Palmerston.	6. Onondaga.
78	Listowell.	9. Cornif. & 8. Oriskany.
88	Millbank.	“
91	Milverton.	“
104	Stratford Junc.	“
105	Stratford.	“
112	Travistock Jn.	“
113	Travistock.	“
127	Woodstock.	“
136	Burgessville.	“
141	Brantford Junc.	“
144	Otterville.	“
149	Can. So. Junc.	“
160	Simcoe.	“
167	Port Dover.	

Wellington, Grey, and Bruce (G. W. Div.).

	Brantford.[153]		
0	Harrisburg.	5 d. Guelph.	734
6	Branchton.	“	897
12	Galt.[159]	“	888
16	Preston.[160]	“	927
19	Hespeler.	“	942
27	Guelph.	“	1079
40	Elora.[161]	“	1297
43	Fergus.	“	1358
49	Alma.	“	

Grand Trunk Railway—

Wellington, Grey, and Bruce (G. W. Div.)—*Continued.*

Ms.			
55	Goldstone.	6. Onondaga.	1461
58	Drayton.	"	1394
62	Moorefield.	"	1351
70	Palmerston.	"	1314
75	Harriston.	"	1264
82	Clifford.	"	1234
91	Mildmay	"	1030
97	Walkerton.[162]	"	933
101	Dunkeld.	"	
104	Cargill.	"	
105	Pinkerton.	"	861
112	Paisley.	"	776
118	Turners.	"	
125	Port Elgin.	"	675
129	Southampton.	"	616

0	Palmerston.		1314
5	Gowanstown.	9. Cornif. & 8. Orisk.	1285
9	Listowel.	"	1263
15	Atwood.	"	1204
19	Henfryn.	"	1166
22	Ethel.	"	1174
27	Brussells.	"	1122
34	Blue Vale.	"	1079
	Wingham Junc.	"	
38	Wingham.	"	1082
44	White Church.	"	1046
50	Lucknow.	"	910
53	Ripley.	"	807
66	Kincardine.[163]	6. Onondaga.	590

Sarnia Branch (G. W. Div.).

0	London.	10. Hamilton.	806
10	Komoka.	"	822
20	Strathroy.	"	747
26	Kerwood.	"	
33	Watford.	11. Chemung & Port.	787
42	Wanstead.	"	702
45	Wyoming.	"	712
51	Petrolia.[164]	"	
51	Mandaumin.	"	647
61	Sarnia.	"	589
—	Point Edward.	"	
—	Port Huron, Mich.	"	

Great Western Division.—Loop Line.

Ms.			
	Buffalo.	9. Corniferous.	
	Black Rock.	"	
	Fort Erie.	"	
16	Welland Junc.	6. Onondaga.	577
23	Marshville.	"	
31	Moulton.	"	
33	Diltz.	"	
40	Canfield Junc.	"	616
48	Cayuga.[165]	"	
53	Nelles' Corners.	9. Cornif. & 8. Orisk.	715
61	Jarvis.	"	701
67	Renton.	"	
72	Simcoe.	"	719
76	Nixon.	"	
81	Delhi.	"	795
88	Courtland.	"	776
92	Tilsonburg.[166]	"	785
94	Tilsonburg Jn.	"	
99	Corinth.	"	767
107	Aylmer.	10. Hamilton.	761
102	New Sarum.	"	
117	St. Thomas.	"	767
122	Payne's.	"	
126	Baird's.	"	
129	Lawrence.	"	742
134	Middlemiss.	"	
139	Ekfrid.	"	
145	Glencoe.	11. Chem. & Portage.	728

London, Huron, and Bruce Division.

0	London.	9. Cornif. & 8. Oriskany.
4	Hyde Park Jn.	10. Hamilton.
8	Ettrick.	9. Cornif. & 8. Oriskany.
11	Ilderton.	"
16	Brecon.	"
20	Clandeboye.	"
26	Centralia.	"
31	Exeter.	"
37	Hensall.	"
39	Kippen.	"
43	Brucefield.	"
50	Clinton.	"
57	Londesborough.	"
61	Blyth.	"
67	Belgrave.	"
73	Wingham Junc.	"
74	Wingham.	"

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161. Elora. Good sections of Guelph formation in cliffs seventy-five to eighty feet high.

162. Walkerton. Good exposure of Erie and Saugeen clays at bend of river, on 28th lot of first range north of Durham road. The Saugeen clays are deposits locally developed and overlying the Erie clay.

163. Kincardine. White and yellow bricks manufactured from drift clays.

164. Petrolia. The best petroleum wells of Ontario are in this vicinity. Surface oil had been known to exist for many years, but was first obtained by boring in 1860. The oil-producing region round Petrolia has an area of about eleven square miles. The surface is level, and consists of a bluish clay to a depth of about one hundred feet. Below this the borings penetrate about three hundred and eighty feet of dolomites, shales, and marls, to the most productive stratum, which is reached at a depth of four hundred and eighty feet. The borings at first produced flowing wells, but pumping is now necessary. Most of the oil is refined in London, Ont. It is supposed to originate in the Corniferous formation.

165. Cayuga. Extensive gypsum deposits about three miles from the town. The bed worked is about five feet in thickness.

166. Tilsonburg. Petroleum has been obtained in this vicinity.

167. Brantford. Erie clay used in manufacture of white brick. Artemisia gravel thirty-five miles.

Great Western Division.

Brantford, Norfolk and Port Burwell R'y.

Ms.			
	Harrisburg.		734
0	Brantford.[167]	6. Onondaga.	659
5	Mt. Pleasant.	"	810
7	Mt. Vernon.	"	839
10	Burford.	"	844
14	Harley.	9. Cornif. & 8. Orisk.	837
16	Hatchley.	"	
21	Norwich.	"	844
22	G.B.&L.E.Cross.	"	
25	Middletown line,	"	
27	Springford.	"	822
32	Can.S.Ry.Cross.	"	797
34	Tilsonburg.[166]	"	785
	Tilsonburg Jun.	"	

Welland Division.

Connecting Lakes Erie and Ontario.

Port Dalhousie to Port Colborne.

	Toronto, G. T. R.		255
	Hamilton.		255
0	Port Dalhousie.	5 a. Medina and Oneida.	
3	St.Cath'rines[168]	"	375
5	Merritton.	5 c. Niagara.	
8	Thorold.[169]	"	553
10	Allanburgh.	5 d. Guelph.	592
11	Allanburgh Jn.	"	
13	Port Robinson.	6. Onondaga.	589
17	Welland.	"	602
20	Welland Junc.	"	
24	Humberstone.	"	
25	Pt. Colborne.	9. Cornif. & 8. Orisk.	586
	Buffalo.	"	

Canada Atlantic Railway.

0	Montreal.[210]		
38	Coteau.	3 c. Chazy.	161
42	St. Plycarpe.	"	
53	Glen Robertson.	"	
61	Alexandria, Ont.	4 a. Trenton.	
68	Kenyon.	"	
72	Maxville.	"	
70	Roxboro Grav. P	"	
87	Casselman.	"	
94	South Indian.	4 c. Hudson River.	
105	Eastman's Sp'gs	4 b. Utica.	
116	Ottawa.[216]	"	
	Chaudiere Falls	4 a. Trenton.	

Grand Trunk Railway.

Midland Division.

0	Toronto.		
	(Union Station).	4 c. Hudson River.	255
1	Don.	"	253
9	Scarboro Junc.	"	547
14	Agincourt.	"	569

Grand Trunk Railway—

Midland Division—*Con.*

Ms.			
17	Millikens.	4 c. Hudson River.	651
20	Unionville.	"	577
23	Markham.	"	640
29	Stouffville.	4 b. Utica.	892
36	Ballantrae.	4 b. Utica.	
38	Vivian.	"	
42	Mt. Albert.	4 a. Trenton.	
49	Ravenshoe.	"	
54	Sutton.	"	
57	Jackson Point.	"	
34	Goodwood.	4 b. Utica.	1090
41	Uxbridge.	4 a. Trenton.	877
45	Marsh Hill.	"	
49	Wick.	"	856
50	Blackwater.	"	
53	Sunderland.	"	851
59	Cannington.	"	846
63	Woodville.	"	896
65	Lorneville Junc.	"	881
67	Argyle.	"	860
70	Eldon.	"	870
73	Portage Road.	"	911
75	Kirkfield.	"	892
78	Victoria Road.	"	837
84	Corson'sCross'g.	"	
87	Coboconk.	"	847
	Port Hope Junc.	"	
0	Port Hope.	"	
5	Quay's.	"	481
8	Perrytown.	"	652
9	Garden Hill.	"	
14	Summit.	"	910
18	Millbrook.	"	772
23	Fraserville.	"	
31	Peterborough.	"	650
24	Bethany.	"	
26	Brunswick.	"	
28	Franklin.	"	
45	Omemee.	"	
49	Reaboro.	"	
56	Lindsay.	"	865
62	Mariposa.	"	884
68	Manilla Junc.	"	955
75	Blackwater.	"	851
77	Sunderland.	"	846
83	Cannington.	"	
87	Woodville.	"	896
62	Cambray.	"	926
73	Grass Hill.	"	
65	Lorneville Junc.	"	881
73	Beaverton.	"	763
77	Gamebridge.	"	797
81	Brechin.	"	757

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168. St. Catherines. Brines obtained in artesian wells here, but too impure for manufacture of salt. Mineral water.

169. Thorold. Good section of Clinton and Niagara in cutting of Welland Canal. Fossils. A band of argillacious limestone eight feet thick, in the Niagara, yields an excellent cement.

170. Madoc. Mines of magnetic iron-ore. A blast-furnace was at one time in operation in Madoc Village, but the ore is now exported. This is the typical region of the Hastings series of the Lauren-

Grand Trunk Railway—
Midland Division—*Con.*

Ms.			
84	Schepeler.	4 a. Trenton.	
88	Uptergrove.	"	
91	Atherly.	"	
93	Couchiching.	"	
94	Orillia.	"	
98	Silver Creek.	"	
102	Uhthoff.	"	
105	Foxmead.	"	
106	Alma.	"	
109	Coldwater.	"	
112	Fesserton.	"	
114	Waubaushene.	"	
116	Sturgeon Bay.	"	
120	Victoria Harbor.	"	
124	Old Fort.	"	
128	Midland.	"	

Peterborough and Lakefield Branch.

0	Pt. Hope.	4 a. Trenton.	
5	Quay's.	"	481
8	Perrytown.	"	652
9	Garden Hill.	"	
14	Summit.	"	910
18	Millbrook.	"	772
23	Fraserville.	"	
31	Peterborough.	"	650
33	Auburn Mills.	"	
35	Nassau Mills.	"	
40	Lakefield.	"	

Belleville Branch.

	Montreal.^{210}		
0	Belleville.	4 a. Trenton.	286
4	Corbyville.	"	
9	Foxboro.	"	
13	Holloway.	"	
15	N. Hastings Jn.	"	516
20	Stirling.	"	415
27	Hoards.	"	
33	Cambellford.	"	507
44	Hastings.	"	635
50	Birdsall's.	"	
53	Blezard's.	"	
57	Keene.	"	
66	Peterborough.	"	650

Madoc Branch.

0	Belleville.	4 a. Trenton.	286
4	Corbyville.	"	
9	Foxboro.	"	
13	Holloway.	"	
15	N. Hastings.	"	516
17	W. Huntingdon.	"	
20	Ivanhoe.	"	
24	Crookston.	"	
27	Moira Lake.	" (Lake.)	519
30	Madoc.^{170}	1 a. Laurentian.	584

Ms.	Whitby and Haliburton Branches.		
0	Whitby Junc.		
1	Whitby.	4 b. Utica.	288
6	Brooklin.	"	539
10	Myrtle.	"	
13	High Point.	4 a. Trenton.	
15	Manchester.	"	
17	Prince Albert.	"	839
19	Port Perry.	"	
26	Seagrave.	"	
28	Sonya.	"	
32	Manilla.	"	955
33	Manilla Junc.	"	
38	Mariposa.	"	884
42	Ops.	"	
45	Lindsay.	"	851
52	Cameron.	"	
56	Halls.	"	
59	Fenelon Falls.	"	
64	Fells.	4 a. Birdseye & Black Riv.	
69	Retties.	1 a. Laurentian.	
78	Kinmount.	"	
80	Miles R'y Junc.	"	
88	Minden.	"	
92	Ingoldsby.	"	
94	Dysart.	"	
99	Gould's.	"	
101	Haliburton.	"	

Toronto to Lindsay, Peterboro., and Port Hope.

0	Toronto.	4 c. Hudson River.	254
1	Don.	"	253
10	Scarboro Junc.	"	547
15	Agincourt.	"	569
18	Milliken's.	"	651
21	Unionville.	"	577
24	Markham.	"	640
29	Stouffville.	4 b. Utica.	892
35	Goodwood.	"	1092
42	Uxbridge.	4 a. Trenton.	877
46	Marsh Hill.	"	
50	Wick.	"	856
51	Blackwater.	"	
58	Manilla Junc.	"	
63	Mariposa.	"	884
67	Ops.	"	
70	Lindsay.	"	851
76	Reaboro.	"	
80	Omemee.	"	
85	Franklin.	"	
87	Brunswick.	"	
89	Bethany.	"	
94	Peterboro.	"	650
102	Fraserville.	"	
107	Millbrook.	"	772
111	Summit.	"	
116	Garden Hill.	"	
117	Perrytown.	"	652
120	Quay's.	"	481
125	Port Hope.	"	287
	Port Hope Junc.	"	

tian of the late Mr. Vennor. The rocks consist of quartzites, conglomerates, limestones, micaceous slates, and argillites, and are considered by Dr. Hunt to represent the Lower Taconic. Dr. Hunt also states that Montalban gneisses and mica schists occur in this neighborhood.

Canadian Pacific Railway.

Ontario Division.—Main Line.

Ms.			
0	Smith's Falls Jn.	3 a. Calciferous.	
6	Pike Falls.	"	
12	Perth.[201]	1 a. Laurentian.	431
21	Bathurst.	"	
27	Maberly.	"	
37	Sharbot Lake Jn	"	
46	Mountain Grove.	"	
51	Arden.	"	
62	Kaladar.	"	
71	Sheffield.	"	
78	Tweed.	4 a. Tren. & 1a. Laur.	571
87	Ivanhoe.[202]	4 a. Trenton.	
96	Cen. Ont. Jn.[203]	"	
105	Blairton.	"	
110	Havelock.	"	
116	Norwood.	"	
126	Indian River.	"	
134	Peterboro.	"	
143	Cavanville.	"	
151	Manvers.	"	
155	Pontypool.	"	1064
167	Burketon.	"	
173	Myrtle.	"	887
182	Claremont.	4 b. Utica.	885
189	Green River.	"	
197	Agincourt.	4 c. Hudson River.	571
207	North Toronto.	"	406
211	Toronto Junc.	"	394
213	Parkdale.	"	
215	Toronto.[204]	"	255
213	Lambton.	"	412
215	Islington.	"	
219	Dixie.	"	
221	Cooksville.	"	393
224	Springfield.	5 a. Medina and Oneida.	
227	Streetsville.	"	499
228	Streetsville Jun.	"	553
231	Trafalgar.	"	
234	Hornby.	"	
239	Milton.	"	663
245	Campb'lville[205]	5 c. Niagara.	989
248	McRae's.	5 d. Guelph.	
251	Schaw.	"	

Ontario Division.—Main Line—*Con.*

Ms.			
258	Leslie.	5 d. Guelph.	1007
264	Galt.[159]	"	936
269	Dumfries.	6. Onondaga.	
274	Ayr.	"	965
279	Wolverton.	"	962
281	Drumbo.	"	1013
285	Blandford.	9 c. Corn. and Orisk.	972
288	Innerkip.	"	972
294	Woodstock.	"	947
299	Beachville.	"	
303	Ingersoll.	"	
308	Putnam.	"	
313	Harrietsville.	"	
319	Belmont.	"	
327	St. Thomas.	10. Hamilton.	

Elora Branch.

	Toronto.[204]		255
0	Church's Falls.	5 c. Niagara.	1260
5	Erin.	"	1295
8	Hillsburg.	5 d. Guelph.	1424
12	Garafraxa.	"	1452
17	Douglas.	"	
	Spires.	"	
25	Fergus.	"	1357
27	Elora.[206]	"	1301

Orangeville Branch.

	Toronto.[204]		255
0	Streetsville.	5 a. Med. and Oneid.	499
1	Streetsville Jun.	"	553
3	Meadowvale.	"	566
5	Churchville.	"	
8	Brampton.	"	724
13	Edmonton.	"	
17	Campb'l's Cross.	"	
18	Cheltenham.	"	
21	Riverdale.	"	
25	Forks of Credit.[207]	"	1068
28	Church's Falls.	5 c. Niagara.	1260
31	Alton.	"	
33	Melville Junc.	"	
36	Orangeville.[208]	5 b. Clin. & 5 c. Niag.	1358

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201. Perth. Potsdam sandstones overlapping Laurentian near here. The peculiar tracks described as *Protichnites* and *Climactichnites* in quarries in first-named formation. Dalhousie or Cowan mines twelve miles distant. Red hematite. Laurentian.

202. Ivanhoe. To Madoc iron-mines (magnetite and hæmatite) 6¼ miles by road.

203. Central Ontario Junction. Branch line to Coehill Iron Mine, about 40 miles distant. Magnetite at junction of granite and crystalline limestone in Laurentian. To Delero 7½ miles by road. Marmora gold-mines. Auriferous mispickel in quartz gangue.

204. Toronto. Pleistocene clay (Erie clay), extensively wrought for the manufacture of cream-colored brick.

205. Campbellville. Escarpment of the Niagara limestone here. The outcrop of the Clinton, which is here thirty to forty feet thick, is below it, but generally concealed by talus.

206. Elora. Good sections of Guelph formation in river cliffs.

207. Forks of Credit. Extensive quarries in Medina sandstone, producing a fine reddish freestone of excellent quality.

208. Orangeville. Artemisia gravels fifty miles.

209. Owen Sound. In cliffs along the lake shore good sections, extending from Hudson River through Medina and Clinton formations, with great mass of Niagara limestone capping the plateau. Excellent yellowish-gray stone in unlimited quantity afforded by last-mentioned formation. It has been used in construction of several lighthouses on the lake. Quarries. Fossils. Deposit of yellow ocher near the town. Sections in road-cuttings exhibit relations of Erie and overlying Saugeen clays.

Canadian Pacific Railway—*Con.*

Ms.	Owen Sound Branch.		
0	Tor'nto, Union Station.	4 c. Hudson River,	255
5	Toronto Junc.	"	
8	Weston.	"	429
16	Woodbridge.	"	558
21	Kleinburg.	"	715
26	Bolton.	"	838
32	Mono Road.	5 a. Medina.	976
34	Cardwell Junc.	"	
41	Charleston.	5 c. Niagara.	1367
44	Alton.	"	1298
45	Melville Junc.	"	
48	Orangeville.	5 c. Nia. & 5 b. Clin.	1398
52	Orangeville Jun.	5 d. Guelph.	1616
56	Laurel.	"	
60	Crombies.	"	
64	Shelbourne.	"	1629
68	Melancthon.	"	
72	Corbettown.	"	
76	Dundalk.	"	1701
81	Proton.	"	1613
86	Flesherton.	5 c. Niagara, 6 m.	1557
92	Markdale.	5 d. Guelph.	1359
98	Berkeley.	"	1329
102	Williamsford.	"	1212
106	Arnott.	"	
109	Chatsworth.	5 c. Niagara, 13 m.	944
114	Rockford.	"	912
118	St. Vincent'sR'd.	"	
122	Owen Sound.[209]	"	586

Teeswater Branch.

	Toronto.[4]		255
0	Orangeville.	5 b. Clin., & 5 c. Ni., Artem. grav., 45 m.	1398
4	Orangeville Jn.	5 d. Guelph.	1616
7	Amaranth.	"	1546
10	Waldemar.	"	1495
12	Luther.	"	1544
23	Arthur.	"	1525
30	Kenilworth.	"	1486
38	Mt. Forrest.	"	1350
44	Pages.	6. Onondaga.	1283
48	Harriston.	"	1246
56	Fordwich.	9 c. Corn. and Oris.	1200
60	Gorrie.	"	1123
62	Wroxeter.	"	1123
69	Wingham Road.	"	
74	Teeswater.	"	1024

Ms.	Perth and Smith's Falls.		
0	Smith's Falls.	3 a. Calciferous.	
6	Pike Falls.	"	
12	Perth.[201]	1 a. Laurentian.	431

Eastern Division.

Between Montreal, Ottawa, Pembroke, and Sudbury.

0	Montreal.[210]	4 a. Trenton.	
1	Hochelaga.	"	70
4	Mile End.	"	225
8	Sault aux Recollets.	"	
11	St. Martin.	3 c. Chazy.	
12	St. Martin Junc.	"	
17	Ste. Rose.	3 a. Calciferous.	85
19	Ste. Therese.	"	
27	St. Augustin.	"	227
32	Ste. Scholastique	"	238
37	St. Hermas.	"	257
43	Lachute.[211]	"	225
48	St. Philippe.	"	262
57	Grenville.	3 c. Chazy.	210
59	Calumet.	3 a. Calciferous.	147
64	Pointe au Chene.	1 a. Laurentian.	188
74	Montebello.	"	172
78	Papineauv'le[212]	"	155
83	N. Nation Mills.	"	
90	Thurso.	2 b. Potsdam.	186
93	Rockland.	1 a. Laurentian.	
99	Buckingham[213]	"	183
103	L'Ange Gardien.	"	
109	E. Templeton[214]	"	155
114	Gatineau.	"	175
118	Hull.[215]	4 a. Trenton.	185
120	Ottawa, Ont.[216]	"	
122	Skeads.[217]	3 c. Chazy.	
125	Britannia.	"	
129	Bell's Corners.	"	
135	Stittsville.	"	
139	Cleary's.	"	
144	Ashton.	"	
146	Appleton.	3 a. Calciferous.	
149	Carleton Junc.	"	
155	Almonte.	"	
159	Snedden's.	3 c. Chazy.	
164	Pakenham.[218]	2 b. Potsdam.	
172	Arnprior.[219]	1 a. Laur. & 3 a. Calcif.	
175	Braeside.	1 a. Laurentian.	
178	Sand Point.	5 and 7. Silurian.	
184	Castleford.	"	

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210. Montreal. The region about Montreal is one of much geological interest. The following formations are represented in the immediate vicinity of the city: Pleistocene, Lower Helderberg, Hudson River, Utica, Trenton, and Chazy. The Chazy is here about two hundred feet thick, and consists chiefly of limestone. Exposures may be seen north of the city, as on the St. Lawrence road, also at Caughnawaga, where there are extensive quarries. The Trenton is here about six hundred feet thick, and is composed of gray and blackish limestones for the most part. Good exposures, with numerous fossils, in quarries at the Mile End and at Pointe Claire. At the last-named locality, Black River beds occur. At the Reservoir, and at many points in Mount Royal Park, limestones, also of Trenton age, but differing in appearance from those of the above-mentioned localities, are well shown. The Chazy and Trenton formations of the vicinity supply most of the building-stone used in the city. The Utica shales may be seen at the upper end of St. Helen's Island and elsewhere, but owing to their soft character are usually concealed. The Lower Helderberg occurs in small outliers only, the most considerable being on St. Helen's Island, and consisting of a dolomitic breccia, which is trav-

Canadian Pacific Railway—
Eastern Division—*Con.*
Between Montreal, Ottawa, Pembroke, and Sudbury.

Ms.		
188	Russell's.	1 a. Laurentian.
191	Renfrew.	"
199	Haley's.	"
206	Cobden.	"
212	Snake River.	"
216	Graham's.	"
219	Government R'd	"
225	Pembroke.[220]	"
236	Pettewawa.	"
246	Chalk River.	"
252	Weston.	"
258	Bass Lake.	"
265	Moorlake.	"
273	Mackey's.	"
277	Rockliffe.	"
287	Bissett.	"
299	Deux Rivières.	"
309	Klock.	"

Eastern Division—*Con.*
Between Montreal, Ottawa, Pembroke, and Sudbury.

Ms.		
319	Mattawa.	1 a. Laurentian.
329	Renton.	"
342	Rutherglen.	"
345	Callander.	"
349	Nosbousing.	"
357	Thorncliff.	"
364	North Bay.	"
375	Beaucage.	"
381	Meadowside.	"
388	Sturgeon Falls.	"
399	Verner.	"
410	Veuve River.	"
413	Veuve.	"
420	Mark Stay.	"
428	Stinson.	"
432	Wahnapitae.	"
438	Romford.	1 b. Huronian.
444	Sudbury.[221]	"

ersed by dikes of nepheline-basalt. The Pleistocene is here divided into—1. Boulder clay; 2. Leda clay; 3. Saxicava sand. The city being built on these deposits, frequent opportunities of examining them are obtained in excavations for drains, cellars, etc. They are in some places highly fossiliferous, and are well shown in some of the quarries at Mile End, where they overlie glaciated surfaces of Trenton limestone. Near Côte des Neiges village, a Pleistocene beach with marine shells at an elevation of 470 feet.

Mount Royal is an intrusive mass, composed principally of diabase, but toward the west end is an important and more recent mass of nepheline-syenite, which is well seen at the "Corporation Quarry." Both the eruptive rock and the surrounding limestones are traversed by numerous dikes. (From "Sketch of Geology of Montreal and Environs," by Dr. B. J. Harrington, in "Hand-Book for the Dominion of Canada." Dawson Brothers, Montreal.)

In Peter Redpath Museum, McGill University, good local and general geological collections.

211. Lachute. The Palæozoic rocks here form a narrow belt of flat country bordering the Ottawa River. The Laurentian highlands may be seen to the north of this part of the railway line, and gradually approach the river.

212. Papineauville. Côte St. Pierre, one of the best localities for *Eozoon*, is reached from this station. Twelve miles by stage to St. André, thence three miles to Côte St. Pierre.

213. Buckingham is the chief point of shipment on the railway of the apatite mined at numerous places within a radius of twenty to thirty miles. Large quantities of apatite may frequently be seen piled here. Extensive deposits of plumbago near Buckingham are not at present worked.

214. East Templeton. This is also an important point of shipment of apatite.

215. Hull. Within a few miles of Hull is an important deposit of magnetic iron-ore, which has been somewhat extensively mined and is exported. Also hydraulic limestone. (See note on Ottawa.)

216. Ottawa. The Laurentides, but a few miles distant, belong to the lower and middle divisions of Sir William Logan's Laurentian system. These two formations, consisting chiefly of gneisses, granites, crystalline limestones, etc., are overlain unconformably by continuous and perfectly conformable series of sedimentary strata of the Cambro-Silurian system, embracing the Potsdam (of the Ottawa and Adirondack regions), Calciferous, Chazy, Bird's Eye and Black River, Trenton, Utica, and Hudson River formations. It was in these measures that the late Mr. E. Billings made his earliest palæontological researches, and these have proved ever since, as then, to be a rich hunting-ground to the palæontologist. There are extensive and varied deposits of marine clays and sands, gravels, boulders, etc., of Pleistocene age. The Leda clay of Green's Creek, Gloucester, six or seven miles from the city, abounds in nodules holding remains of the seal, fishes, insects, shells, and plants. The total number of species representing the fossil fauna and flora of this locality does not fall far short of three hundred. Brigham's Quarries, Hull, through which the Canadian Pacific Railway runs, are undoubtedly the best Cambro-Silurian crinoid quarries in America. Deposits of magnetite, apatite, and baryta occur within a short distance of Ottawa. Both the Black River and Trenton formations yield excellent limestones for lime or building purposes, while the Chazy of Nepean afforded much of the material (sandstones) used in the erection of the Parliament buildings. A bed of hydraulic limestone occurring at the top of the Chazy has been worked and employed in the manufacture of the "Hull cement." (Note by Mr. H. M. Ami.) In Ottawa the museum and offices of the Geological Survey of Canada. Excellent collection of Canadian rocks, minerals, and fossils.

217. Skeads. Most of the sandstone used in the construction of the Parliament buildings, Ottawa, was quarried near here.

218. Pakenham. Pleistocene deposit, containing mixture of marine and fresh-water shells near Pakenham Mills, 266 feet above the sea level.

219. Arnprior. Bluish gray-banded Laurentian marble somewhat extensively quarried near here.

220. Pembroke. Excellent sections of Laurentian in railway cuttings for many miles west of this point. The rocks shown "are for the most part highly characteristic red, gray, and dark-banded gneisses; felspathic and hornblendic, and frequently garnetiferous and micaceous. There are also some large bands of gray and white crystalline limestone; but none of these are exposed along the line of

Canadian Pacific Railway—

Ms.	West of Sudbury Junction.		
444	Sudbury.[221]	1 b. Huronian.	
455	Chelmford.	"	
460	Vermilion.	"	
463	Phelan's Pit.	"	
478	Archer.	"	
501	Pogomasing.	"	
510	Spanish Forks.	1 a. Laurentian.	
515	No. 23 Siding.	"	
518	West Branch.	"	
530	Pass Landing.	"	
532	Biscotasing.	"	

Gap of 350 miles from Biscotasing to Port Arthur, in which no stations yet permanently located, though road for the greater part built.—Dec., 1884.

St. Eustache Branch.

Ms.	Station	Formation	
0	Montreal.	4 a. Trenton.	
19	Ste. Therese Jn.	3 a. Calciferous.	
27	St. Eustache.	"	

St. Jerome Branch.

Ms.	Station	Formation	
0	Montreal.[210]	4 a. Trenton.	
1	Hochelaga.	"	70
4	Mile End.	"	225
8	Sault aux Recollets.	"	
11	St. Martin.	3 c. Chazy.	
12	St. Martin Jn.	"	
17	Ste. Rose.	3 a. Calciferous.	85
19	Ste. Therese.	"	
21	St. Lin Junc.	4 a. Trenton.	
27	St. Janvier.	3 a. Calciferous.	220

Ms.	St. Jerome Branch—*Con.*		
33	St. Jerome.[222]	1 c. Norian or Upper Laurentian.	311
39	New Glasgow.	"	

St. Lin Branch.

Ms.	Station	Formation	
0	Montreal.[210]	4 a. Trenton.	
19	Ste. Therese.	3 a. Calciferous.	
21	St. Lin. Junc.	4 a. Trenton.	
24	Mascouche.	"	
27	Ste. Anne.	"	
30	Les Plaines.	3 c. Chazy.	
34	St. Lin.	3 a. Calciferous.	

Aylmer Branch.

Ms.	Station	Formation	
0	Aylmer.	3 c. Chazy.	222
2	Duchesne Mills.	"	
5	Belmonte.	"	
7	Hull.	4 a. Trenton.	185
9	Ottawa.	"	

Brockville Line.

Ms.	Station	Formation
0	Carleton Junc.	3 a. Calciferous.
5	Beckwith.	"
9	Franktown.	2 c. Potsdam.
15	Welsh's.	"
18	Smith's Falls.	3 a. Calciferous.
21	Story's.	"
25	Irish Creek.	"
30	Walford.	"
32	Bell's.	"
34	Jelly's.	"
36	Bellamy's.	"
39	Clark's.	"
41	Fairfield.	"
46	Brockville.	2 c. Potsdam.

the railway west of Mattawa, where it leaves the valley of the Ottawa River." (Dr. A. R. C. Selwyn, in "Descriptive Sketch of Geology, etc., of Canada.")

221. Sudbury. "After passing the Wahnapite River bridge, the Huronian rocks commence, with a series of flinty felsites or felsitic quartzites, succeeded by dark-gray quartzose conglomeritic beds; also massive crystalline diorites, red, fine-grained syenites, and a great variety of highly altered volcanic agglomerates, felspathic and dioritic." (*Ibid.*)

From Sudbury the Algoma Mills branch runs over Huronian rocks to the shore of the lake. The main line westward, to Port Arthur by the north shore of Lake Superior, will be in operation soon. From Sudbury it passes for about seventy miles over Huronian rocks. Thence to within about fifteen miles of the Nepigon River the Laurentian is the most widely spread formation, though intersected by belts of Huronian and with extensive granitic and dioritic intrusive masses. On both sides of the Nepigon, rocks of the Nepigon series (Cambrian) are found, and are separated by a mass of intrusive granite only from the Animike rocks of the vicinity of Port Arthur.

222. St. Jerome. The rocks of the Norian or Upper Laurentian may be seen here, but are more typically shown at New Glasgow village, six miles distant, and the present terminus of the railway.

223. The numbers affixed to the Animikie, Keweenian, and Upper and Lower Potsdam, in the table on p. 58, are those used for convenience in this chapter, but are not intended to affirm the precise correlation of these with other formations similarly numbered in adjacent states.

III. Manitoba and North-West Territory.

Including districts of Assiniboia, Alberta, Saskatchewan, and Athabaska, to base of Rocky Mountains.

List of Geological Formations.

20. QUATERNARY.	**Alluvium.** Lake deposits of Red River Valley and Peace River, etc. **Stratified Sands and Gravels, and Moraines.** **Boulder Clay or Till.** Upper Boulder Clay. Interglacial Lake Deposit. Lower Boulder Clay. Shingle Beds. Of Southern Alberta, etc.					
19. TERTIARY.	**Miocene.** Conglomerate Sandstone and Argillite of Cypress Hills, etc.					
18. CRETACEO-TERTIARY, LARAMIE.	**Porcupine Hill Series.** **Willow Creek Series.** **St. Mary's River Series.**	Of Southern Alberta.	**Fort Union.** **Laramie.**	Of Souris River, etc.	**Wapite River Group.**	Of Peace River.
18. CRETACEOUS.	**Fox Hill Series.** **Pierre Series.** **Belly River Series.** **Niobrara or Benton Series.**	Of Alberta.	**Fox Hill Ser.** **Pierre Series.** **Niobrara Series.** **Benton Series?**	Of Manitoba, etc.	**Smoky River Group.** **Dunvegan Group.** **Ft. St. John Group.**	
9–12. DEVONIAN.	**Limestones of Manitoba Lake, etc.**					
4. SILURO-CAMB.	**Trenton Group.** (Limestones of Winnipeg Lake, Red River Valley, etc.)					
1 b. HURONIAN.						
1 a. LAURENTIAN.						

Canadian Pacific Railway.—*Con.*

Western Division.

Ms.	Winnipeg and Port Arthur Section. +4		
0	Port Arthur.[224]	Animikie 2. L. Camb.	
6	Fort William.	"	603
17	Murillo.	"	944
27	Kaministiqua.	1 b. Huronian.	1010
37	Finmark.	1 b. Huronian and 1 a. Laurentian.	1177
44	Buda.[225]	1 a. Laurentian. 447	~~1147~~
55	Nordland.	"	1550
~~59~~	~~Dexter.~~	"	
65	Linkooping.	"	1531
75	Savanne.	"	1503
86	Upsala.	1 b. Huronian.	1559
93	Carlstad~~t~~.	1 a. Laurentian.	1512
103	Bridge River.	"	1540
115	English River.	1 b. Huronian.	1514
123	Martin.	1 a. Laurentian.	1554
133	Bonheur.	"	1527
144	Falcon.	"	1504
151	Ignace.	"	1448
160	Butler.	"	1420
170	Raleigh.	1 b. Huronian.	1437
180	Taché.	"	1363
190	Brulé.	"	1352
202	Wabigoon.	"	1252
209	Barclay.	"	1248
Ms.	**Winnipeg and Port Arthur Section—*Con.***		
221	Oxdrift.	1 a. Laurentian.	1159
231	Eagle River.	"	1183
241	Vermilion Bay.	" See U.S.4, p.57	1216
249	Gilbert.	"	1214
256	Parrywood.[226]	"	1286 (Bl. point marker This = 1350 ft)
272	Hawk Lake.	"	1286
284	Beaver.	"	1183
288	Rossland.	Granite, 4 miles.	1125
297	Rat Portage.[226]	1 b. Huronian, 6 m.	1084
300	Keewatin.[227]	1 a. Laurentian.	1072
308	Ostersund.	1 a. Laurentian.	1102
313	Deception.	"	1133
320	Kalm~~e~~ar.	"	1214
328	Ingolf.	"	1181
	(Manitoba.)		
338	Telford.	"	1056
348	Renne.	"	1050 +8
359	Darwin.	"	968
368	Whitemouth.	"	904
374	Shelly.	"	926
384	Monmouth.	"	876
394	Beausejour.	20. Alluvium.	811
400	Tyndall.	"	793
408	Selkirk.[228]	"	740
414	Gonor.	"	
421	Bird's Hill.	"	
428	Winnipeg Junc.	"	
429	Winnipeg.[229]	"	737

Canadian Pacific Railway—*Con.*

Ms.	Winnipeg and Rocky Mountain Section.		
0	Winnipeg.[229]	20. Alluvium.	737
2	Air Line Junc.	"	
7	Bergen.	"	
15	Rosser.	"	772
29	Marquette.	"	782
35	Reaburn.	"	781
40	Poplar Point.	"	790
49	High Bluff.	"	806
56	Portage la Prairie.	" +20	830
64	Burnside.[230]	"	843
72	Bagot.	20. Glacial drift, probably overlying Cretaceous.	912
77	McGregor.	"	937
85	Austin.	"	981
93	Sidney.	"	1208
106	Carberry.	"	1233
114	Sewell.	"	1230
128	Chater.	"	1185

Ms.	Winnipeg and Rocky Mountain Section—*Con.*		
133	Brandon.[231]	20. Glacial drift overlying 18. Cretaceous, 290 m.	1170 +2
141	Kenmay.	"	1335
149	Alexander.	"	1366
158	Griswold.	"	1399
166	Oak Lake.	"	1391
180	Virden.	"	1420
197	Elkhorn.	"	1606 1626
211	Fleming.	"	1760 1780
219	Moosomin.	"	1860 1880
226	Red Jacket.	"	1893 1913
235	Wapella.	"	1907 1927
243	Burrows.	"	1924 1944
249	Whitewood.	"	1939 1959
264	Broadview.	"	1936 1956
279	Grenfell.	"	1933 1953
286	Summerberry.	"	1914 1934
294	Wolseley.	"	1926 1946
302	Sintaluta.	"	1960 1980
312	Indian Head.	"	1900 1920

224. Port Arthur. Good geological headquarters for examination of Nepigon, Animike, and Huronian series. Silver-mines in neighborhood and fine crystalline minerals. Attractive scenery. The formations assigned to the various stations on this line, from Port Arthur to Rat Portage, may in some cases be in error, as no geologically colored map showing the precise positions of stations is at present available. After leaving the Animike of the lake shore, the rocks are all Laurentian or Huronian, with intrusive granitic masses. Fine sections of the rocks of these series, and the dikes and veins traversing them, occur in numerous cuttings.

225. Buda. The reddish color of the drift deposits, characteristic of the neighborhood of Lake Superior and northeast portion of Minnesota, ends about here.

226. Rat Portage. On northern extremity of Lake of Woods good headquarters for excursions on lake, where Laurentian and Huronian rocks are displayed in almost continuous sections along the shores. Gold-mines. Lake extremely picturesque, with innumerable islands. Both west and east from Rat Portage, on the railway, but more particularly to east, very fine examples of perched blocks and glaciated rock surfaces. Numerous cuttings in Laurentian, Huronian, and drift deposits. From Rat Portage, in a distance of about forty miles eastward (to near Parrywood station), the succession of rocks traversed is as follows: Laurentian, Int. granite, Laurentian, Huronian, Laurentian, Huronian, Laurentian.

227. Keewatin. Railway twice crosses boundary between Laurentian and Huronian between Ostersund and this station. Here good opportunity of examining junction.

228. Selkirk. Quarries close to station in Galena limestone. Fossils.

229. Winnipeg. The alluvium of the Red River Valley is a deposit of a former great lake of Post-Glacial age, which Mr. Warren Upham has proposed to name Lake Agassiz. The shore lines of this body of water may still be traced, at various levels, to the east and west of the valley. The lake must have received the waters of the Saskatchewan, and had its outflow southward to the Mississippi. The alluvial deposits are of great thickness, and consist above of silty or loess-like material; below frequently of plastic clays more or less distinctly laminated. The upper layers make excellent cream-colored brick. Alluvium completely conceals the underlying rocks in this valley; but these are, doubtless, for the most part Silurian limestones like those of Lake Winnipeg.

230. Burnside. In 1874 a boring was carried out at Rat Creek, near this place, by the Geological Survey. The following section was obtained: Blue clay, 70 feet; sand, gravel, and stones, with water, 18 feet; white limestone (probably Devonian), 42 feet; gray crystalline rock (Laurentian or Huronian), 77 feet. West of Burnside the country rises considerably, and this point may be assumed as the western limit, on this line, of the Red River Valley alluvium. Not far west of this the edge of the Cretaceous probably overlaps the old rocks found in the above-mentioned boring, but the whole surface is completely masked by drift deposits. (See note on Brandon.)

231. Brandon. From Winnipeg to Brandon, alluvium and glacial drift, the latter consisting of boulder-clay overlain by stratified sands and gravels. The western edge of the alluvial plain of the Red River Valley is indefinite on the line of the railway, which follows the wide depression of the Assiniboine. To the southeast and northwest it is marked by the escarpment of the second prairie steppe or plateau, constituting Pembina, Riding and Duck "Mountains," and the Porcupine and Basquia Hills. Sands and gravels connected with the western edge of "Lake Agassiz" may be observed in several places. The underlying rocks are completely concealed by the drift deposits, but the Cretaceous probably overlaps the Silurian and Devonian rocks of the Winnipeg basin a few miles west of Austin station. At Brandon the Assiniboine Valley itself is entered. It may be taken as typical of the wide trough-like valleys generally characterizing the rivers of the second and third prairie plateaus. Small exposures of Pierre shales (Cretaceous) in some parts of the Assiniboine Valley.

232. Moose Jaw. Observe the line of the Missouri Côteau in the distance, to the southwest.

233. Mortlach. From Brandon to Mortlach there are no exposures of the underlying rock in the vicinity of the railway, and over the second prairie plateau generally, these are seen as a rule only in the river valleys. To Mortlach, however, the whole plain is, with little doubt, based on the Pierre

Canadian Pacific Railway—

Winnipeg and Rocky Mountain Section. *Continued.* +20

Ms.				
324	Qu'Appelle.	20. Glacial drift overlying 18. Cretaceous,	2110	2130
332	McLean.	"	2258	2278
341	Balgonie.	"	2164	2184
347	Pilot Butte.	"	1993	2013
356	Regina.	"	1862	1882
373	Pense.*	"	1854	[illegible]
381	Belle Plaine.	"	1877	[illegible]
390	Pasquia.	"	1851	1871
398	Moose Jaw.[232]	"	1743	1763
406	Boharm.	"	1768	1788
414	Caron.	"	1817	1837
423	Mortlach.[233]	20. Glacial drift overlying Ft. Union Laramie.	1935	1955
432	Parkbeg.[259]		1958	1978
443	Secretan.[234]		2258	2278

* 18. Pierre Shales struck in bore-hole.

Winnipeg and Rocky Mountain Section. *Continued.*

Ms.				
452	Chaplin.	20. Alluv. overlying 18. Cretaceous.	2176	2196
461	Ernfold.[235]	20. Glacial drift overlying 18. Cretaceous.	2264	2284
471	Morse.[235]	"	2250	2270
480	Herbert.	—50 ft. accg. to profile	2287	~~2307~~ 2257
489	Rush Lake.	20. Glacial drift overlying 18. Pierre shales.	2276	2296
496	Waldec.	"	2333	2353
510	Swift Cur'nt.[236]	18. Pierre Shales, 111 miles.	2400	2420
519	Leven.	"	2440	2460
529	Goose Lake.	"	2441	2461
538	Antelope.	"	2532	2552
546	Gull Lake.[237]	"	2539	2559
554	Cypress. Profile makes this 40 or 50 ft. lower	"	2632	2652?
565	Sidewood.	"	2431	2451
575	Crane Lake. —100 accg. to profile - - -		2544	~~2564~~ 2464
586	Colley.	"	2485	2505

shales of the Cretaceous. The boulder-clay, with overlying stratified drift, and fine alluvium marking sites of former lakes or ponds, cover the entire country. At or near Mortlach the increasing elevation of the plain brings in the base of the Fort Union Laramie, but there are no exposures near the railway. No western limit is given for these beds, as their precise extent has not been determined. They do not, however, extend on the line as far as the Old Wives Lakes. They are well shown to the southeast on the Souris River, and there hold numerous seams of lignite.

234. Secretan. At Secretan the drift hills of the Missouri Côteau are well displayed. The Côteau belt, where crossed by the railway, is not so well defined as near the 49th parallel, but may be said to extend from Parkbeg station westward to a point four or five miles beyond Secretan. See Note 259.

235. Morse. Between Ernfold and Morse a second line of Côteau-like hills is crossed. The Old Wives Lakes (saline) appear to occupy an interval between this branch of the Côteau and that above described. They have evidently at one time been much more extensive, and have no outlet.

236. Swift Current. The Pierre shales (Cretaceous) are exposed on the stream a short distance north of the line, and in valleys 1½ miles northeast from station. In general the deposits of Glacial period and subsequent alluviums only are seen near the line.

237. Gull Lake. Sections of Fox Hill sandstones overlying Pierre shales in Cypress Hills, a few miles south of this station. The Cypress Hills constitute a remarkable plateau, which may be seen extending to the south of the railway for many miles east and west. It is capped by Miocene Tertiary beds, of which the most characteristic is a conglomerate formed of well-rolled pebbles of the harder rocks of the Rocky Mountains.

238. Walsh. The dividing-line between the Pierre shales and the underlying Belly River series probably passes between Forres and Walsh stations; but, as elsewhere in this region, the rocks are generally concealed by the later drift deposits.

239. Irvine. Half a mile south of station fine sections showing Pierre shales, with coaly layers near base, overlying Belly River series. Fossils.

240. Medicine Hat. Good sections of boulder-clay and drift in railway cuttings to eastward.

241. Stair. One mile southward from this station, on the banks of the Saskatchewan, lignite coal is mined in rocks of the Belly River subdivision of the Cretaceous. There are two seams, of which the lower (about five feet thick) is worked. Fine exposures of rocks all along this part of the river.

242. Langevin. In boring for water at this station, a copious flow of combustible gas has been tapped.

243. Cassels. Here also combustible gas in large quantities flows from well. The Pierre shales must overlap the Belly River series near here, but the surface shows drift deposits only. On the river, a few miles to the south, the base of the Pierre is marked by a fine seam of coal 4′ 6″ thick.

244. Bassano. Good sections showing base of Laramie and top of Pierre, four miles southwest on Bow River, where a coal-seam 4′ 4″ thick occurs.

245. Crowfoot. Lignite coal 9′ thick exposed on Bow River to south, and underlying Crowfoot at depth of about 100′. Shaft sunk to coal north of track, 135 feet deep.

246. Calgary. Excellent exposures of Laramie rocks along Bow River to south of line from Bassano to this point. The plain, as seen from the railway, a gently undulating drift-covered surface, showing no exposures of the underlying rocks. At bridge across the Elbow River, at Calgary, massive Laramie sandstones. Calgary is the farthest western point on this parallel to which Laurentian fragments from the northeastward have been traced. The boulders and gravel farther west appear to be entirely derived from the Rocky Mountains or of local origin.

247. Radner. For about twenty-eight miles west of Calgary the railway, following the Bow River, passes over Laramie rocks, nearly horizontal, but forming the northern extension of a wide synclinal occupied farther south by the Porcupine Hills. Between Cochrane and Radner the belt of disturbed and flexed rocks which lie along the base of the mountains, constituting the foot-hill country, is entered. Numerous fine sections of Cretaceous and Laramie in river-banks to Kananaskis.

248. Kananaskis. The Cretaceous or Laramie sandstones are here nearly flat, but appear to dip

[illegible]

Canadian Pacific Railway—

Winnipeg and Rocky Mountain Section. *Continued.*

Ms.				
596	Maple Creek.	18. Pierre Shales.	2490	2470
615	Forres.	"	2426	2406
628	Walsh.[238]	18. Belly River Series, 107 m.	2427	2407
638	Irvine.[239]	"	2489	2469
651	Dunmore.	"	2393	2373
660	Medicine Hat[240]	Profile calls for +100 = 2262 or	+2162	2142
668	Stair.[241]	"	2423	2403
686	Suffield.	"	2451 ~~2431~~	~~2431~~
695	Langevin.[242]	"	2491	2471
704	Kininvie.	"	2425	2405
713	Tilley.	"	2458	2438
733	Cassils.[243]	18. Pierre Shales.	2513	2493
750	Lathom.	"	2554	2534
757	Bassano.[244]	18. Laramie.	2583	2563
766	Crowfoot.[245]	"	2692	2672
776	Cluny.	"	2843	2823
785	Gleichen.	"	2946	2926
801	Strathmore.	"	3025	3005
819	Langdon.	"	3288	3268
830	Shepard.	"	3364	3344
839	Calgary.[246]	"	3408	3388
848	Keith.	"	3542	3522
862	Cochrane.	"	3732	3712
872	Radnor.[247]	18. Cretaceous, and 18 Laramie.	3845	3825
881	Morley.	"	4052	4032
893	Kananaskis.[248]	"	4190	4170
901	The Gap.[249]	9 & 14. Devono-Car.	4218	4198
906	Canmore.[250]	18 Cretaceous.	4273	4253
914	Duthil.	"	4362	4342
919	Banff.[251]	"	4551	4531
927	Castle Mountain.	9 and 14. Devono-Carboniferous.	4531	4511

More fully in Rep. Can. for 1882-83-84, p. 153C; there, too, as given by Dawson, requiring /20+.

Winnipeg and Rocky Mountain Section. *Continued.*

Ms.				
938	Silver City.[252]	9 and 14. Devono-Carboniferous.	4624	4644
945	Eldon.[253]	2–4. Cambrian.	4782	480
955	Laggan.[254]	"	5005	502
962	Stephen.[255]	9 & 14. Devono-Carbonif. (summit).	5296	5316

British Columbia boundary line.

Emerson Section.

	St. Vincent.	20. Alluvium.
0	Emerson.	"
10	Dominion City.	"
18	Arnaud.	"
26	Dufrost.	"
35	Otterburne.	"
42	Niverville.	"
54	St. Norbert.	"
63	St. Boniface.	"
64	Winnipeg Junc.	"
66	Winnipeg.	"

Manitoba and Northwestern Railway of Canada.

0	Portage la Prairie.	Alluvium overlying Devonian.
9	Macdonald.	"
16	Westbourne.	"
26	Woodside.	"
34	Gladstone.	"
51	Arden.	"
61	Neepawa.	Drift overlying Cretac.
66	Stony Creek.	"
78	Minnedosa.	"

below the Palæozoic limestones of the mountains, which are seen in cutting just beyond this station. Above cutting, well-marked glaciation due to former Bow Valley glacier. (The railway here enters the Rocky Mountains.) Below mouth of Kananaskis River, fine falls over Cretaceous sandstone on Bow River. The great limestone series of the mountains, characterized above as Devono-Carboniferous, is the most important constituent of the range in this part of its length. No separation, except quite locally, has yet been found possible between the Devonian and Carboniferous parts of the series.

249. The Gap. The valley beyond this point becomes quite wide, and turns to the northwest, following a belt of Cretaceous rocks.

250. Canmore. The valley here floored by the Cretaceous rocks above referred to, while limestones form the mountains on both sides. The Cretaceous is in the form of a long synclinal trough, compressed and overturned to the northeastward. Looking southeastward from this point down the valley, a section of the overturned rocks is seen in the distant hills.

251. Between Duthil and Banff, near the railway and to the north about two miles from Banff, openings have been made on anthracite coal-seams in the metamorphosed Cretaceous. Seams three to five feet. Coal of excellent quality.

252. Silver City. Castle Mountain, a remarkably bold range of Devono-Carboniferous limestone, nearly horizontal, rises immediately behind this place. Numerous discoveries of copper-ore in the vicinity.

253. Eldon. A few miles beyond Silver City the valley again turns to the northwest, following axis of anticlinal, which brings up Cambrian slates and quartzites. Mountains on both sides of valley still continue for the most part limestone.

254. Laggan. Remarkably picturesque lake, with glacier at head a few miles to the south.

255. Stephen. Near summit, between headwaters of Saskatchewan and Columbia Rivers, the general structure of the watershed range is synclinal, but complicated by minor flexures. Cambrian rocks appear a few miles down valleys both east and west of the summit. Grand peaks to north and south of valley of pass, in several cases exceeding 11,000 feet altitude. This is the only railway in North America from which actual glaciers of almost Alpine magnitude may be seen. Observe snow-field and glacier in first valley from north, west of Stephen.

256. Stonewall. Excellent exposures, in quarries, of Silurian limestones, in some beds highly fossiliferous.

257. Stone Fort. Quarries near Stone Fort and St. Andrews. Fossils.

Canadian Pacific Railway—*Con.*

Ms.	Pembina Mountain Section.	
0	Winnipeg.[229]	20. Alluvium. 737
4	St. James.	"
18	Sa Salle.	"
30	Osborne.	"
43	Morris.	"
56	Rosenfeld.[258]	"
70	Gretna.	"
66	Plum Coulee.	"
81	Morden.	"
88	Thornhill.	"
96	Darlingford.	Pierre Shales.
102	Manitou.	"

Manitoba S. W. Colonization Railway.

0	Winnipeg.	20. Alluvium.
7	Murray Park.	"

Manitoba S. W. Colonization Railway—*Continued.*

Ms.		
14	Headingly.	20. Alluvium.
27	Starbuck.	"
45	Elm Creek.	"
47	Maryland.	"
51	End of Track.	"

Stonewall Section.

0	Winnipeg.	20. Alluvium.
1	Air Line Junc.	"
13	Stony Mountain.	4 c. Hudson River.
20	Stonewall.[256]	"

West Selkirk Branch.

0	Winnipeg.	20. Alluvium.
	Stone Fort.[257]	4 b. Galena Limestone.
22	W. Selkirk.	"

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258. Rosenfeld. Copious flow of brine struck here in deep boring in Silurian.

259. Parkbeg. The so-called Continental moraine is represented in Dakota and the North-West Territory of Canada by the Missouri Côteau. It would appear that this and the so-called Côteau des Prairies in Minnesota and Dakota are parts of the same great feature. Their elevation is similar, and they are equally characterized by the immense profusion of erratics with which they are strewn, and by basin-like swamps and lakes. In southwestern Minnesota and eastern Dakota this elevated tract, according to Winchell, called by the earliest French explorers Côteau des Prairies, meaning highlands of the prairies, is 500 to 1,000 feet above the Minnesota River, and 1,800 to 2,000 feet above the sea. In the Côteau, then, viewed as a whole, we have a natural feature of the first magnitude, a mass of glacial *débris* and traveled blocks, with an average breadth of perhaps thirty or forty miles, and extending diagonally across the central region of the continent, from the southeastern corner of Minnesota far into northern Canada, a distance of about 800 miles. Dr. George M. Dawson, from whose writings this note is compiled, was the first to recognize the glacial origin of the Missouri Côteau. He pronounces it one of the most remarkable features of the Western plains in their northwestern extension, and as certainly the most important monument of the glacial period existing there. As to its origin, while he believes that the Côteau may possibly represent a Continental moraine, his examination of it led him to consider it as more probably due to a deposit of material from floating ice along the sloping front of the third prairie steppe. It is a question which should not be prejudged, as so many difficulties remain to be elucidated, from whatever stand-point it may be regarded. As to the similar deposit farther south in Minnesota and Dakota, etc., T. C. Chamberlin and other geologists, who have critically studied it, are quite decided in their belief that it is a terminal moraine. The superficial deposits are to be, for geologists, the great subject of the future. J. M.

IV. British Columbia.

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12	Port Hammond.	"	* 17
20	Whannock.	"	15
30	"St. Mary Msn."	"	32
40	Nacomin.	"	24
49	Harrison River.	"	42
58	Agassiz.[302]	18. Cretaceous overlain by drift.	51
68	Ruby Creek[303]	Metamorphic rocks of Coast Ranges.	96
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137	Fraser R. Bridge.[307]	18. Cretaceous, "Shasta Group."	580
143	Lytton.[308]	Metamorphic rocks of Coast Ranges.	686
149	Section House.	"	766
153	Section Ho.[309]	19 b. Mio.(Volcanic).	688
160	Drynok.	"	769
166	Spence's Bridge.	"	789
177	Chinaman's Ranch.[310]	13. Carboniferous.	877
194	Ashcroft.[311]	18. Cretaceous.	1081
206	Penny's Ranch.[312]	18. Miocene (Volcanic).	1276

* Reduced levels above ordinary high water of Pacific Ocean.

301. The rocks forming the south side of Burrard Inlet, and underlying the flat or gently undulating tract about the mouth of the Fraser, are, so far as known, Tertiary, and, at least in part, of Miocene age. The covering of drift being, however, thick, and the region as yet but partially explored, it is difficult precisely to fix the limits of these rocks. Cretaceous rocks of the Shasta group, and possibly of the overlying series to which the coals of Vancouver Island belong. also occur.

302. The Cretaceous rocks above referred to are supposed to cross the Fraser about here. They are somewhat extensively developed on Harrison Lake, and hold abundance of *Aucella Piochii*, which may be considered as the most characteristic fossil of the Cretaceous of the mainland of British Columbia.

303. The metamorphic rocks of the Coast Ranges, named the "Cascade Crystalline series" in the preliminary classification, consist of a great variety of gneissic and schistose materials. Orthoclase felspars are seldom developed, and dioritic rocks are abundant. The series also includes limestones. It is, with little doubt, of the same age with the similar rocks of the vicinity of Victoria, and these are known to be Palæozoic, and probably, in part at least, Carboniferous. The series has been largely built up of contemporaneous volcanic rocks which have since been extremely metamorphosed. Large granitic and syenitic intrusive masses are frequent.

304. At Silver Peak, near Hope, at a height of about seven thousand feet, exceptionally rich silver-ores occur. These exist in veins traversing a small outlier of the Shasta Cretaceous which occupies the summit of the mountain. Litigation has so far prevented the development of these mines.

305. At this point the line enters the Cañon of the Fraser, and the scenery becomes grand in the extreme, the river breaking through the axial portion of the Coast Range. From the mouth of the Anderson River (Boston Bar) the valley becomes again comparatively wide, and the mountains retreat to a greater distance.

306. The immediate valley of the river is excavated, in this part of its course, in dark slaty or schistose rocks, which have been referred to as the "Anderson River series" in preliminary reports. The age of these is uncertain, but they are very possibly Triassic. They underlie the lowest Cretaceous, and rest between it and the older crystalline rocks, and have evidently been the source of the gold which is found on this part of the Fraser. The bar and bench diggings of the Fraser were at one time very remunerative, and were the first in British Columbia to attract attention and lead to an influx of miners. Subsequently the mines of the Cariboo country and rich gold finds in other districts, drew away the mining population.

307. A trough of Shasta Cretaceous here crosses the river obliquely. It forms the hills and mountains which rise above the valley on the east, for many miles to the southward. The rocks consist of hard, greenish sandstones or quartzites, with beds of conglomerate, and evidently represent, for the most part, the deposit of a shore-line. At Jackass Mountain, on the wagon-road, they are well shown, and have yielded specimens of *Aucella Piochii* and other fossils.

308. The line here leaves the Fraser to follow the Thompson River. Immediately north of Lytton the Cretaceous trough above referred to—which appears in the intervening distance to be interrupted—resumes, and characterizes the Fraser Valley for a long way to the north.

309. The Tertiary rocks of this part of the province are all provisionally classified as Miocene, and are probably of the age of the "Truckee Miocene" of the 40th Parallel Report. They consist generally of sandstones, shales, etc., capped by a great thickness of volcanic materials which are largely basaltic. The sedimentary part of the formation frequently holds lignites or coals, and a number of fossil plants have been obtained from it.

310. The rocks provisionally classed as Carboniferous are, at least in great part, of that age, and hold limestones characterized by *Fusulina*. They consist, however, for the most part, of quartzites and hard shales, and contain great beds of contemporaneous volcanic matter, in association with which serpentines occur. These rocks are well displayed on the wagon-road from Ashcroft northward to Clinton. The serpentines, with associated conglomerates, etc., are best seen on this road between Hat Creek and Mundorf's.

311. The rocks in this vicinity are much altered, but those in the valley appear to belong to an isolated Cretaceous area.

312. *General Note on Unfinished Portions of Line east of Kamloops Lake.*—The line may now (December, 1884) be said to be practically completed to Kamloops Lake, leaving, under construction, a length of about one hundred and eighty miles eastward from this point to the mouth of the Kicking Horse River, on the Columbia. The lower end of Kamloops Lake lies on rocks of the Câche Creek

series, which have been characterized in a previous note; the greater part of the lake is, however, bordered by volcanic rocks of Tertiary age. Cherry and Battle Bluffs, on opposite sides of the lakes, are believed to represent the core of an ancient Tertiary volcano. In the former considerable veins of magnetite occur. Remunerative gold placers have been worked for many years on the Tranquille River, which flows into the lake. Near the town of Kamloops the rocks of the Câche Creek series reappear and characterize the banks of the South Thompson River to the lower end of Little Shuswap Lake, though the higher portion of the plateau to the south is composed of volcanic Tertiary rocks. White silty deposits, due to the last stage of the glacial period, are cut into terraces along the banks of the river. Little and Great Shuswap Lakes, with Adam's Lake, are fjord-like bodies of water occupying deep, mountain-bordered valleys in the western portion of the Gold Range. The lakes are bordered by gneissic rocks and crystalline schists, which have been referred to collectively, in the reports of the Geological Survey, as the *Shuswap series*, and are now believed to be Archæan. These rocks probably exceed thirty-two thousand feet in thickness, and are divisible into several subordinate series. For further information on the country from the mouth of the Fraser to this point, see "Descriptive Sketch of Physical Geography, and Geology of Canada, 1884," and "Report of Progress, 1877–1878." Leaving Shuswap Lake, the line follows up the valley of Eagle Creek and traverses the Gold Range by the Eagle Pass to the west crossing of the Columbia River. Thence it crosses the Selkirk range to the east crossing of the Columbia, and follows that river up (southward) to the mouth of the Kicking Horse. This portion of British Columbia may be said to be geologically unknown, but consists, so far as ascertained, of rocks similar to those of the Shuswap Lakes, with quartzites and schists which are probably Cambrian.

V. Steamboat Routes.

I. Montreal to Quebec. Little of geological interest is to be seen on this route, the river-banks being generally low, or where higher usually showing only drift deposits. Near Quebec, sections of Cambrian and Cambro-Silurian rocks.

Quebec and Gulf Ports. Quebec to Pictou, Nova Scotia, with calls at intermediate ports. A picturesque and geologically interesting route.

Quebec. (See Note 24. under Intercolonial Railway.) Soon after leaving Quebec, a fine distant view of the Montmorenci Falls. Beyond the east end of the Island of Orleans, Laurentian rocks form the north shore. At St. Paul's Bay, Little Mal Bay, and Murray Bay, small outliers of Cambro-Silurian. Beyond these the north shore is entirely Laurentian. Behind Murray Bay the mountains are particularly bold. The south shore to beyond St. Anne des Monts is composed of Cambrian rocks, which form picturesque hills near Bic.

Father Point. Pilot station. Cambrian.

Metis. Cambrian. A sea-side resort.

Beyond Matanne the Shickshock Mountains to the south. The higher portions composed of Pre-Cambrian rocks with extensive granitic intrusions. Beyond St. Anne des Monts the south shore is fringed with Cambro-Silurian rocks to Gaspé Bay.

Gaspé. Ship Head, at northern entrance to Gaspé Bay, a bold promontory. Lower Helderberg limestone. The shores of Gaspé Bay are generally characterized by Devonian rocks. Excellent sections. Fossil plants. The south point of Gaspé Bay is composed of rocks of the Bonaventure (Lower Carboniferous) series. This occupies the coast to the Baie des Chaleurs.

Percé Silurian limestones here appear below the Bonaventure, and form the remarkable pierced rock, two hundred and ninety feet high, which gives the place its name.

Baie des Chaleurs. (See notes under Intercolonial Railway.) The northern shore of the eastern part is principally composed of Silurian and Bonaventure rocks; the southern, at Bathurst, Bonaventure formation; eastward, to Point Miscou, Middle Carboniferous.

Miramichi Bay. Shores all Middle Carboniferous. Carboniferous rocks constitute the whole New Brunswick shore to Pictou. Prince Edward Island, Permo-Carboniferous and Triassic.

Quebec to Saguenay River.

Quebec. (See notes under Intercolonial Railway and Quebec and Gulf Port steamers.)

Murray Bay. An outlier of Cambro-Silurian rocks here occupies the coast for a distance of six miles, and runs up the Murray River for a similar distance, gradually narrowing out. The rocks are well displayed in White Point at the wharf and at Les Ecorchés on the east side of the bay. They consist of limestones and calcareous sandstones, Black River, and Trenton, and are highly fossiliferous in some places. Fossiliferous glacial clays on some parts of the beach at low tide. Ancient sea-margin terraces with marine shells to height of over 600 feet in this vicinity.

Rivière du Loup. Cambrian. Marine shells in glacial clays of beach on east side of bay at mouth of river.

Tadousac. At mouth of Saguenay River. Laurentian. Fine examples of terraces at several levels. The Saguenay River, from this point to Ha Ha Bay, is the finest example of a fjord on the eastern coast of North America, and is celebrated for its grand and gloomy scenery. It possesses all the characters of a true fjord—bold rocky shores without beaches, uniformity in width, great depth in its upper part, and comparatively shallow water at its mouth. From Tadousac to Ha Ha Bay is a distance of about sixty miles. Near this point the valley bifurcates, one branch reaching to Lake St. John—forty miles—by Chicoutimi, while the other is occupied in part by Lake Kenogami. The rocks to Ha Ha Bay and Chicoutimi are all Laurentian, and generally heavily glaciated. Near the wharf at Ha Ha Bay an intrusive mass characterized by anorthosite felspar. Round Lake St. John extensive area of Norian rocks, with overlying Cambro-Silurian, and glacial clays with marine shells. The existence of this great fjord is probably due to the greater drainage area tributary to it as compared with other rivers on the north shore, and it was probably in the first instance excavated by the river at a period of greater continental elevation than the present.

Port Mulgrave to Sydney, C. B. (Steamers connecting with Eastern Extension Railway at Port Mulgrave and running through the Bras d'Or Lakes to Sydney, C. B.)

Port Mulgrave. (See Notes 65 and 66, under Eastern Extension Railway.)

The Bras d'Or Lakes are celebrated for their picturesque scenery. They are almost altogether surrounded by a fringe, of varying width, of Lower Carboniferous rocks, behind which rise hills of Pre-Cambrian rocks. The formations met with in Cape Breton generally are, however, very varied.

Sydney. Coal-formation rocks, with the most important coal deposits of Cape Breton. The principal workings are in the Sydney main seam, averaging about six feet thick, and these already extend in some places to a considerable distance beneath the sea. Fine section on northwest side of Sydney Harbor, described by Mr. Brown as including thirty-four seams of coal and forty-one underclays with *Stigmaria*. Erect trees and *Calamites* at eighteen distinct levels. Sydney mines afford good coal for gas-making and steam purposes, yielding a strong coke.

II. Toronto or Kingston to Montreal by Steamer. This is a favorite route with tourists. After leaving Toronto, the north shore of Lake Ontario is composed of Hudson River rocks for twenty miles. Thence Utica twenty miles, Trenton one hundred miles. The rocks are generally heavily covered with drift, which often forms steep banks. Both shores, and the islands at the eastern extremity of the lake, are based on Black River limestones. The north shore is then occupied by Laurentian for about thirty miles, the river cutting through a narrow neck of these rocks, which connects the great Laurentian area to the north with that occurring in New York State. This produces the well-known scenery of the Thousand Islands. For ten miles above Brockville the rocks on the north shore, Potsdam; south shore, Laurentian and Potsdam. Thence Calciferous on both shores twenty-five miles. Thence to Mill Roches (twenty-seven miles), north shore, Chazy; south shore, Calciferous. Thence Calciferous on both shores, twenty-four miles. Thence to Cotean (fifteen miles), north shore, Chazy; south shore, Calciferous. Thence, for eight miles, both shores and Grand Island, Calciferous. Thence, in twenty-six miles, Potsdam, Calciferous, Black River, Trenton, Utica, in regular succession to Montreal. (See notes on Grand Trunk Railway, which runs parallel to north shore of lake and river.)

The Rapids of the St. Lawrence.—Throughout that portion of the river characterized by rapids, the rocks are those of the Cambro-Silurian system. The Lachine Rapids occur over the outcrop of the Trenton limestone, the wide basin occupied by the river below being excavated in the softer Utica shales. With this exception, no very marked connection between the geological structure and the existence of the rapids is evident. The rapids may be said to begin below Prescott, but are unimportant till the Upper Long Sault is reached, thirty miles below that place. Four and a half miles below these are the Longue Sault Rapids, which are twelve miles in length, with a fall of forty-eight feet. Farther down, at Côteau, the rapids recommence, and are known as the Côteau Rapids. Below these is calm water for about five miles, when the Cedar Rapids, a mile and a half long, occur. After three miles of calm water are the Cascade Rapids, below which Lake St. Louis, at the mouth of the Ottawa River, is entered. The Lachine Rapids, between this lake and Montreal, are the last, with a descent of forty-five feet. Above the Lachine Rapids the descent of the river is one hundred and seventy-five ~~miles~~, making the total descent, from Lake Ontario to the head of ocean navigation in the harbor of Montreal, two hundred and twenty feet. The average fall of the river is about eighteen inches to the mile, but a large part of this descent is accomplished in the various rapids. These are surmounted by vessels ascending the river by a series of canals, aggregating forty-two miles in length.

III. Routes from Sarnia, Owen Sound, Collingwood, etc., to Port Arthur (connecting there with C. P. Railway).

Two main routes are followed—one to the south of Manitoulin Islands to Sault St. Marie, the other to the north of the islands to the same point. The boats leaving the last-mentioned ports frequently take the north shore route, which, from a geological or picturesque point of view, is to be preferred.

The south shore of the Manitoulin Islands is throughout composed of Niagara limestones, with outlying patches of Guelph in some places.

After clearing Notawasaga Bay, the northeast shore of Georgian Bay is Laurentian to and at Killarney. Thence the shore of the mainland is for seventy-five miles Huronian, the off-lying islands consisting of Cambro-Silurian rocks, from the Black River series to the Niagara. The north shore is then for twenty miles Laurentian, this formation forming a narrow band with Huronian behind. Then twenty miles Huronian to Bruce Mines.

Bruce Mines. Good locality for studying the Huronian rocks. Copper-mines at one time extensively worked; at present closed. The veins traverse a mass of interstratified diorite. The ore is chiefly copper pyrites. From Bruce Mines for ten miles, north shore, Huronian; south shore, Cambro-Silurian. Thence to Lake Superior, both Sugar Island and the southwest main shore of peculiar red and spotted sandstone of Potsdam or Chazy age. Thence to Port Arthur steamers generally run far from land. The north shore is principally Laurentian and Huronian to Nipigon Bay, whence Lower Cambrian rocks characterize the shore and form all the off-lying islands to Thunder Bay.

Thunder Bay. (See Note 224, under C. P. Railway.)

IV. Victoria to Nanaimo and Comox and Northward.

Victoria. Highly altered rocks dioritic, felspathic, and micaceous, in a few places becoming almost gneissic, with interbedded black argillites and crystalline limestones. The latter in a few places hold obscure fossils, which are Palæozoic and very probably Carboniferous. Many intrusive syenitic, etc., masses; one of which characterizes both sides of Victoria Harbor at the entrance. The rocks of this vicinity may be taken as typical of those forming the axial portions of Vancouver Island, and are largely altered volcanic products. Limestone may be observed near entrance to Beacon Hill Park, and at the shore at the west end of the town. Fossils in limestone on road near east side of Esquimalt Bay. Very fine glaciated rocks everywhere along the shore. These are overlain by boulder-clay, and this again by stratified clays and sands which in some places yield marine shells. Good sections of all these deposits in shore cliffs. (See papers in "Quart. Jour. Geol. Soc.," Vol. XXXIV., p. 89, and *ibid.*, 1881.)

From Victoria, northward along coast, similar rocks to Saanich Point, the end of which is fringed by Cretaceous.

Cowichan Harbor. South side, Cretaceous. North side, metamorphic rocks (Carboniferous?).

Maple Bay. South side, Cretaceous; north side and at wharf, similar metamorphic rocks. From Maple Bay, for eight miles, coast metamorphic, off-lying islands Cretaceous. Thence to Dodd Narrows, coast and island Cretaceous. (Productive coal measures.) Just north of Dodd Narrows, high cliffs of these rocks.

Nanaimo and Departure Bay. Productive coal measures (Cretaceous). Extensive coal-mines. Seams worked five to fifteen feet. These are true bituminous coals, yielding a good coke, and suitable for gas manufacture. From Departure Bay, for fourteen miles, the coast chiefly of metamorphic rocks like those above described. Thence to Comox, forty-two miles, Cretaceous.

Comox. An extensive coal-field, but by reason of the more accessible position of Nanaimo the mines here are not at present worked. On Texada Island, to the northeast, fine deposit of magnetic iron-ore.

N. B.—The route above described is that taken by coasting steamers. Steamers bound northward to Port Simpson and Alaska generally pass farther out near the off-lying islands. These are almost altogether composed of Cretaceous rocks, and, in consequence of their general northeastward dip, the outer tier of islands displays the higher members of the formation as here developed. The southwestern sides of the islands generally form low sandstone cliffs.

Route Northward from abreast Comox to Port Simpson and Alaska. From Comox the Cretaceous rocks probably extend in a wide belt along the shore nearly to Seymour Narrows, but are heavily covered by drift deposits, which form white cliffs. High mountains in the interior of Vancouver Island composed, so far as known, of crystalline rocks, with extensive granite intrusions.

Seymour Narrows and northward to Alert Bay. Metamorphic and crystalline rocks. (See Note 303, Can. Pacific Railway, W. Coast portion.) Near Port McNeil, Cretaceous rocks again form a strip of low country, extending back from the shore, and continue to Beaver Harbor. Thomas Point and north shore of Beaver Harbor, and thence to north end of Vancouver Island, all rocks of the older series. Similar metamorphic and crystalline rocks, with interbedded slaty argillites and limestones, and granitic intrusions northward to Wrangel, in Alaska. In vicinity of Port Simpson, slaty argillites and mica schists with limestones extensively developed. Near Wrangel similar mica schists yield very fine garnet crystals. Wrangel is at the mouth of the Stickeen River, by which the gold-mines of Cassiar are reached.